Determinants of Women's Uptake of New Barrier Methods for HIV Prevention in Urban South Africa

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Summary

Although there have been recent advances in HIV treatment, women still do not have a means to protect themselves from sexual transmission of HIV discreetly. Microbicides are products that would be applied vaginally to prevent HIV acquisition. Several microbicide products are being tested for their effectiveness in preventing HIV, and further studies of cervical barriers, such as the diaphragm, are planned. If found effective introduction and distribution systems need to be developed quickly to ensure women can access products and introduce them into their relationships. This study looks at determinants of women's demand for different barrier methods for HIV prevention to learn lessons for the introduction of new technologies such as microbicides and the diaphragm.

A discrete choice experiment (DCE) was undertaken to identify critical factors to women's uptake of products. An iterative approach to the development of the DCE tool was taken. Qualitative group and individual interviews with women generated a wide range of potential factors influential to demand. An attribute identification workshop was introduced as a systematic method to reduce these attributes to the most important factors and identify the best way to represent them in the survey; this included the presentation of product effectiveness by the risk of HIV acquisition and becoming pregnant. During this workshop, women were given individual worksheets on which to rank the importance of the different attributes and levels in their decision to introduce, use and collect products. This provided individual responses in a group interview setting, which generated quantitative ranks on importance of attributes and their levels. Subsequently, a representative community survey was conducted among 1017 women in three Johannesburg townships. Women were asked questions about their socio-demographic backgrounds, their reproductive health histories and their preferences for different barrier methods and their distribution and promotion were elicited by a DCE.

This study showed the usefulness of the attribute identification workshop in providing a structured framework for using women's attribute and level rankings to identify the importance of attributes generated in qualitative interviews and reduce these into a feasible and comprehensible DCE instrument. The analysis of women's preferences showed that there was a strong interest in the new barrier methods, microbicides in particular. The level of HIV effectiveness was very important in women's choices and will have an important impact on product uptake. Additionally, women who were successful in using condoms were predicted to have lower uptake of new products. Preferences for different distribution channels and ways of collecting product or advertising messages did not vary between

PAGE NUMBERING AS ORIGINAL

products. However there was diversity in women's preferences for advertising messages, in particular in their valuation of promoting products for enhanced sexual pleasure, where employed women rated it positively.

This study shows that women are very capable of using hierarchical messages about HIV effectiveness to make informed choices about how to best protect themselves from HIV in their situations. The different barrier methods can be distributed through similar distribution systems, but having a range of advertising strategies is likely to increase uptake of products by widening their appeal across different groups of women.

Dedication

Approaching the end of this voyage, though theory, fieldwork and estimation, I want to pause to remember what it is really about.

Every day women are becoming infected with HIV, because they are unable to protect themselves with the prevention methods currently at their disposal.

I dedicate this thesis to all the women navigating the minefield of relationships and survival.

May we soon find new tools to facilitate this journey,
for my generation of women and our daughters,
and ensure products are made available in ways we can introduce into our relationships and sustain consistent use.

Acknowledgments

The DfID-funded Microbicide Development Programme funded this project and was groundbreaking by incorporating a large body of non-clinical research alongside a clinical trial.

With so many people having personally contributed to this work, it is a challenge where to start thanking you all. Firstly, thanks to Charlotte Watts and Lilani Kumaranayake for providing the opportunity to being part of such a stimulating group (HIVTools), joining LSHTM, and working on MDP. You have both provided immeasurable professional and personal support throughout this journey. I am one of the lucky few to have found a match.

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During the fieldwork in South Africa, I was hosted by the Reproductive Health and HIV Research Unit. Their team made contributions to many versions of the proposal, the questionnaire and the protocol, in particular Sinead Delany, Jocelyn Moyes and Catherine MacPhail. Additionally, Catherine provided detailed guidance on the qualitative analysis and setting up a survey, without which the data collection could not have been started or finished. Helen Rees has untiringly reviewed many versions of conference abstracts, luckily mostly successful. The experience taught me a lot, in particular about myself. Ngiyabonga ka khulu, South Africa.

Many thanks go to the women of Ekurhuleni for participating in the different stages of research. The team of fieldworkers and supervisors from Progressus Research and Development (under leadership of Dirk Taljaard) was always full of enthusiasm and energy on many long days and evenings of preparation and data collection. During the focus group discussions, Prudence Ngoako did an amazing job drawing out women's stories; Audrey Makwanasi had a wonderful enthusiasm for women's barrier methods and provided many stories of why they are so important for South African women. Gaph Phatedi was inspiring in his ease in the communities and in managing the team. With him in charge, I could always feel confident things would be okay. Mohlalepule Tsepe and I formed an outstanding team during the fieldwork and in doing so also became close personally. Thank you Mohlalepule, your friendship was more important than you could have ever guessed!

A number of people provided critical input at different stages of this study. Al Profy, from Endo Pharmaceuticals, supplied microbicide applicators that made the DCE more real for the participants. David Nowitz from the Society for Family Health, provided helpful suggestions on promotional messaging, as did Saul Johnson, from Khumanani. The latter also supplied the survey team with booklets on HIV prevention, which were found very helpful by the respondents. Seema Vyas was patient in answering my many questions on market segmentation analysis using principal components and cluster analysis.

Then towards the end a few people were instrumental in finding my way out of the web of analysis. Brett Day provided important suggestions during his HESG presentation of my DCE chapter. Catherine Payne unveiled the design limitations which allowed me to become psychologically ready to draw it to a close. Alec Miners commented on the methods chapter from a non-developing country perspective. Charlotte Mendel and Gashaw Mulatu assisted in the final edits of this thesis. My examiners, Mandy Ryan and Alan Whiteside, provided many detailed and valuable comments and must be acknowledged for ensuring getting a PhD was not taken for granted.

Though I seem to be the last man standing, Josephine, Valeria, Anna and I started our PhDs around the same time. It was always comforting to know that at whatever time I was working, they probably were too. A number of friends led the way and provided lots of personal support and friendship as well as practical advice on how to get through it. Peter, Karina, and Lorna, thanks for all your guidance and encouragement. The concern of my elders was always a comfort; Susan, Paul and Rainbow all empathised with different aspects of the task and complemented each other perfectly.

Though I have truly enjoyed most[1] of this experience, my closest have had to bear it. Tsehai, my sun, came to remind me that life is not all work and microbicides and to show me that doing a PhD is relatively easy. Abay, you are still *yenne jegna*. This thesis was definitely a team effort and could not have been accomplished without your support, inspiration, late night econometric discussions and just being there. I cannot thank you enough; I know it was exhausting!

[1] And the parts that were not enjoyed at least taught me many unintended and unexpected lessons.

Table of Contents

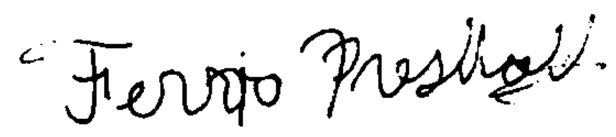
List of Tables

List of Figures

List of Boxes

Declaration by candidate

I have read and understood the School's definition of plagiarism and cheating given in the Research Degrees Handbook. I declare that this thesis is my own work, and that I have acknowledged all results and quotations from the published or unpublished work of other people.

Signed: 

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List of acronyms

Acronyms	
AIDS	Acquired immunodeficiency syndrome
ANOVA	Analysis of variance
ARV	Antiretroviral drugs
CV	Contingent valuation
DCE	Discrete choice experiment
DHS	Demographic and Health Survey
EA	Enumeration area
FGD	Focus group discussion
HIV	Human immunodeficiency virus
IDI	In-depth interview
IEC	Information, education, and communication
IIA	Independence of irrelevant attributes
IV	Inclusive value
LMIC	Low and middle income countries
LM	Lagrange mulitiplier
LR	likelihood ratio test
LSHTM	London School of Hygiene and Tropical Medicine
MNL	Multinomial logit
NL	Nested logit
OLS	Ordinary least squares
PCA	Principal components analysis
R	Rand
RDP	Reconstruction and development programme
RHRU	The Reproductive Health and HIV Research Unit
RPL	Random parameters logit
SDC	Socio-demographic characteristics
SES	Socio-economic status
STI	Sexually transmitted infection
WDI	World Development Indicators
WTP	Willingness to pay

SECTION I: BACKGROUND

Chapter 1. Introduction

1.1. Background

HIV/AIDS continues to take its toll on economies, communities, families, and individuals around the world [1]. Approximately 33 million people are infected with HIV globally; 67% live in Sub-Saharan African [2]. In this region, women are disproportionately affected, accounting for nearly 60% of all people living with HIV [2]. Among the youth (15-24 years), this difference is even more extreme, with a prevalence that is four times greater among the young women in South Africa than among the young men [2].

Not only are girls and women biologically more susceptible to acquire HIV in a sex act, but there are a range of socio-political factors contributing to their vulnerability [3]. The ABC (Abstinence, Be faithful, use a Condom) method has largely failed women, for whom none of these components may be a feasible alternative because [4]: 'A'. Women's economic survival may rely on sexual partnerships; they may want to become pregnant; and/ or sex may not be consensual [5]. 'B'. Being faithful will not protect a women if her partner is unfaithful [4, 5]; 'C'. Firstly, male and female condoms can be difficult to access, in general, and secondly, condom use can be especially difficult to negotiate within steady partnerships [6, 7], which now constitute a substantial source of infection for women [8]. The female condom has provided some women with a tool they can initiate, but uptake has been limited as yet, and still relies on the consent of the male partner. There is a huge need for methods that women can initiate and use more discretely [9-12].

However, it is not all doom and gloom for women. The roll-out of anti-retroviral therapy (ART) has exceeded expectations; with around 3 million people on treatment at the end of 2007, and about two-thirds of this number live in Sub-Saharan Africa [2]. In most countries more women are accessing treatment than men thanks to screening during pregnancy within programmes to prevent mother to child transmission in addition to the HIV treatment programmes available to both men and women [2]. However, the number of newly-infected people is rising more quickly than the number who are receiving treatment; and though very important, treatment will not solve the epidemic [13]. During the 2008 International AIDS Conference the importance of dual efforts that support both treatment and prevention was emphasised, as was the need for new prevention tools [13].

Some of the new prevention options that are being tested, in particular the diaphragm and microbicides, may provide women with more options to protect themselves, if they are found to be effective (Box 1-1). Additionally, a second generation female condom has just received regulatory approval in the United States by the Federal Drug Administration [14]. It is these products (microbicides, the diaphragm, and the female condom) with the male condom that will be referred to as barrier methods for HIV prevention.

The diaphragm and other cervical barriers are being explored for effectiveness against HIV [15-17]. It is thought that the mechanism of action of the diaphragm is by generating a physical barrier over the cervix, which is considered a key point of entry for HIV [18]. Although the only large scale effectiveness trial undertaken on the diaphragm showed no impact over and above the male condom [19, 20], further analysis of the trial data is being undertaken and new trials with improved product designs are being explored.

Microbicides are substances that, when applied vaginally, may reduce the risk of HIV infection. A number of different applications are being explored (Box 1-1), including gels, tablets, foams, films and possibly slow release rings [4]. First generation products act to block viral entry and would be coitally-dependent products, i.e. to be inserted prior to the sex act [5]. In addition, a new generation of antiretroviral-based products is being developed to target HIV replication more specifically [21]. The aim is for these formulations to be long-acting so they can be used at regular intervals, unassociated with a specific sex act [21].

In the long term, it is thought that the greatest protection against HIV and STI may lie in a combination of products; either combinations of chemical compounds or a combination of gels with physical barriers such as the diaphragm.

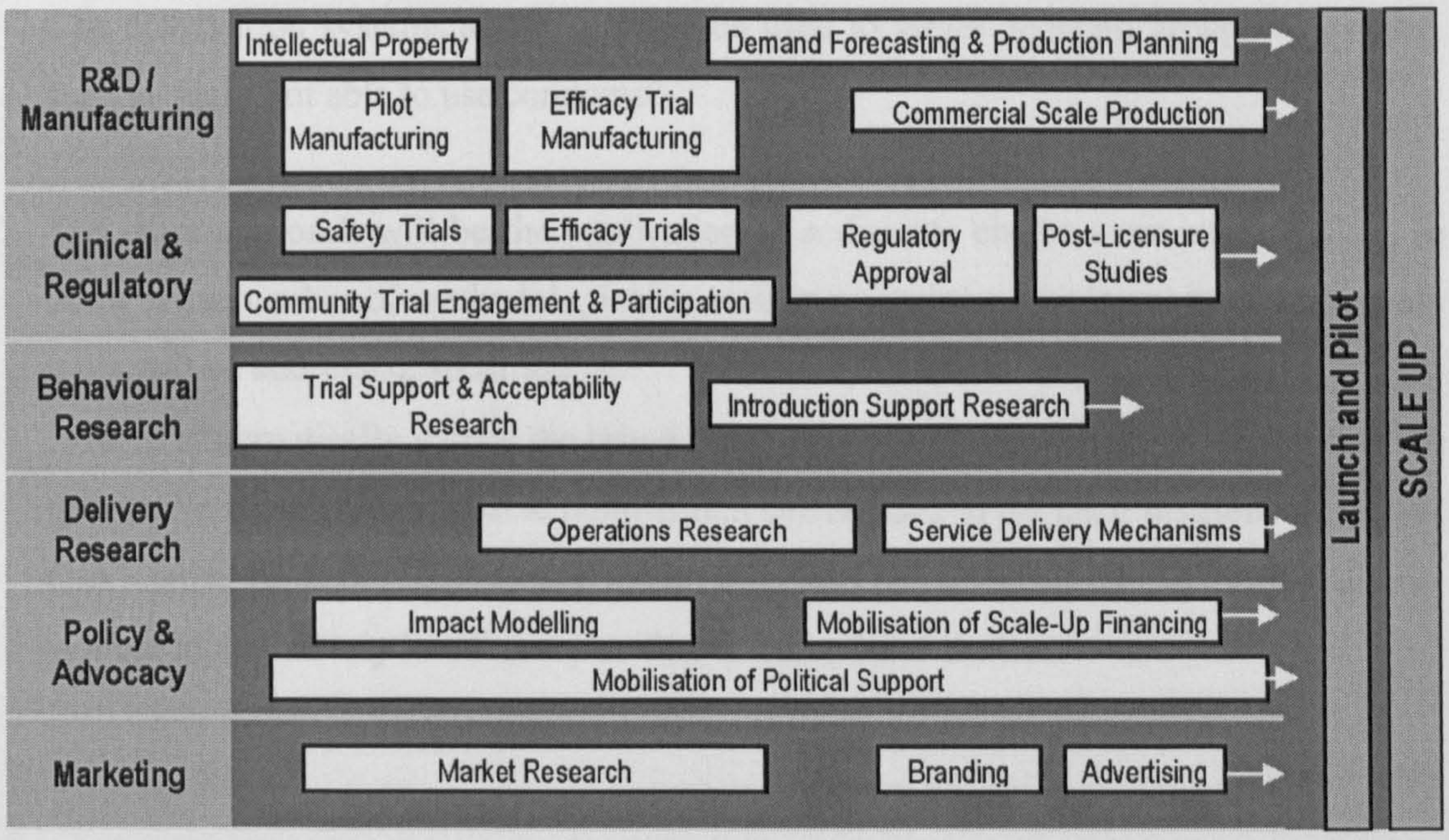
Box 1-1 HIV Prevention Trial Pipeline

	Microbicide - cellular sulphate	HSV-2 treatment - susceptibility	Microbicide - PRO2000 & BufferGel	Oral TDF – IDU Thailand	Oral TDF, Truveda,
	Male circumcision-infectiousness	Microbicide - carraguard	HSV-2 treatment - infectiousness	Oral Truveda – MSM (iPrEx)	Tenofovir Gel - VOICE
Oral TDF – West Africa (Ph II)	Female Barrier-diaphragm		Oral TDF – MSM US (PhII)	Microbicide - Tenofovir Gel CAPRISA	Oral Truveda – Fem PrEP
Microbicide - SAVVY	HSV-2 treatment		Vaccine - Prime/Boost Thailand	Oral Truveda – Heterosexual Botswana	Index Partner Treatment
Male Circumcision - Susceptibility	Vaccine - adenovirus Step/Phambili		Microbicide - PRO2000	Oral Truveda – Partners PrEP	Microbicide - Dapivirine IPM
2006	**2007**	**2008**	**2009**	**2010-2011**	**2012+**

From Rosenburg (2009) [22]

Once an effective new product is found, there are still a number of critical steps and potential bottlenecks between getting a product from the factory to the bed. An overview of these can be found in Source: Rosenburg (2008) [23]

Figure 1-1.



Source: Rosenburg (2008) [23]

Figure 1-1 Critical path to microbicide access

To introduce products, country level regulatory approval must be obtained. For antiretroviral-based microbicides, it is likely that regulatory approval will only be granted as

a prescription-only product, thereby restricting product distribution to the formal medical sector. Early generation products, which do not contain antiretroviral agents, may become available over the counter. This would allow for more flexible distribution systems including social marketing. The mobilisation of policymakers is necessary to adopt products into national and local health policy. Distribution systems must be designed to ensure availability, accessibility and affordability of products [23]; this includes gaining support from providers for the product. Finally, products and their distribution need to be acceptable to consumers (women and their partners) so that they will be used consistently. It is the last of these steps that this thesis aims to address.

1.2. Study aims

This study aims to explore the determinants of urban South African women's uptake of barrier methods for HIV prevention to inform the distribution of new barrier methods[2]. In particular it aims to answer the following policy questions:

- How is the uptake of new barrier methods likely to vary by product characteristics, such as effectiveness, and by women's characteristics, such as use of current barrier methods (substitution)?
- How can new barrier methods best be distributed and promoted to facilitate women to access and introduce them into their partnerships?
- Can distribution systems and promotion be used to target different groups of women, such as those not able to use condoms?

The main approach will be the application of a discrete choice experiment (DCE). In doing so, a number of methodological questions around the development of DCE study tools will be addressed, specifically:

- How to systematically reduce the broad range of attributes and levels elicited during the qualitative research to a useable number that can be used in the DCE instrument?
- Can relative product effectiveness' / risk reductions be portrayed satisfactorily to allow women in a relatively low literacy setting to make valid choices?

[2] The terms 'methods' and 'technologies' are used interchangeably. 'Method' is the standard terminology, but 'technology' emphasises the fact that the focus is on the use of products, not HIV risk reduction strategies related to behaviour change such as abstinence or partner reduction. New barrier methods are considered microbicides and the diaphragm, male and female condoms are the existing barrier methods.

1.3. Thesis outline

This thesis can be divided into 4 sections: Section 1 provides the background, including the review of the literature; Section 2 provides the methods; Section 3 presents the empirical results; and Section 4 draws out the main conclusions.

In the background section, Chapters 2 to Chapter 4 present a review of the existing relevant literature, which establishes a background to the results presented in later chapters. The literature review starts with an examination of the empirical literature on the determinants of demand for health and health care, specifically focussing on for reproductive health goods and services, particularly in South Africa in Chapter 2. The neoclassical economics framework for studying demand is presented in Chapter 3. This describes how demand is a function of the product's own price, the prices of substitutes, income, and preferences [24]. However, neoclassical economics does not provide a framework for studying the uptake of new goods or services. The theoretical framework for studying demand in this thesis is based on two main theories: diffusion theory and Lancaster's theory of demand [25-27]. Diffusion theory specifies general characteristics that influence the speed and level of uptake [27]. Lancaster's theory of demand describes the full value of the good or service as the sum of the value of its attributes. In Chapter 4 the review of empirical research methods describes the operationalisation of Lancaster's theory of demand in discrete DCEs. The value of the attributes is empirically obtained from DCEs wherein people are asked to make choices that force trade-offs [28, 29]. This then allows for the identification of critical factors that influence uptake.

The second section presents the aims and the iterative methods for developing and implementing the community survey instrument in Chapters 5 to 8. Drawing on the review, the thesis aims and objectives are presented in Chapter 5 along with a framework for studying the determinants of demand for barrier methods. Three main realms of determinants are identified: firstly, determinants at the user level, such as partner types, education level, and desire for additional children. Secondly, determinants at the technology level, related to the physical characteristics of the products, such as the ability to use it in secret and its effectiveness. Finally determinants at the distribution strategy level are considered, such as where and how products can be collected, and the ways in which they are promoted.

Chapter 6 presents the iterative process of the qualitative research (FGDs) in generating a wide range of attributes and levels deemed important by the target group and of the IDI's to

pilot the study instrument. Chapter 7 focuses on the attribute identification workshop. This is a new methodology for identifying key attributes to include in the DCE, based on women's own prioritisation of attributes. It concludes that the final choice of attributes and levels should be a balance between those critical attributes that women choose and attributes that can be changed, as well as information relevant to developing introduction and distribution strategies. Chapter 8 provides the details of the community survey implementation of the DCE study, among a random sample of 1017 adult sexually active women who were interviewed in Greater Johannesburg.

Section 3 of the thesis describes results from the community survey. Chapter 9 provides a description of the sample and compares the survey population with socio-demographic characteristics of nationally representative surveys to explore the generalisability of the results on women's preferences [30] [31].

Chapter 10 analyses women's socio-demographic and behavioural characteristics to explore the existence of market segments using principal components analysis, cluster analysis and ANOVA. Subsequently, an analysis of women's directly elicited preferences (willingness to pay responses) for the products reduces the wide range of factors down to a reasonable number of socio-demographic characteristics to carry forward in the analysis of preferences elicited in the DCE.

In the last two results chapters the DCEs are analysed. The first one on preferences for physical attributes (Chapter 11) and second one on preferences for distribution attributes (Chapter 12). Both analyses use the multinomial logit model as the base model. In Chapter 11 the physical attributes analysis also uses the nested logit model. This estimator models the choice to switch from the use (or non-use) of a condom during the last sex act separately from the choice between new barrier methods.

The analysis of distribution attributes in Chapter 12 looks at women's preferences for different distribution channels, how they would like to collect products at these outlets, and the types of promotional messaging that are used. This analysis also evaluates the use of the random parameters logit model, which allows for heterogeneity in preferences between women. The interaction between distribution strategies and products is tested in order to verify whether the various products will need different distribution systems.

The concluding chapter summarises the methodological and empirical results of the thesis. These are compared with the existing literature, their validity and generalisability is

considered, as well as caveats and areas for future research. This chapter aims to reflect on the research methods, process and results as a whole and the contribution that the thesis makes to the field of DCE and HIV prevention research. The lessons that can be learned for future introduction of new barrier methods are discussed.

Chapter 2. Determinants of demand for health care services and products in LMIC

2.1. Introduction

This chapter seeks to review the relevant literature and summarise the evidence on key factors leading to women's uptake of new products and services. The review first looks broadly at determinants of the demand for health care; then reviews the literature on demand for more related services and products, i.e. reproductive health services and products, and barrier methods. The final section looks at these issues in the South African context.

2.2. Determinants of demand for health care services

Studies of the demand for health and health care have a long history, and date back to the 1970s [32], with Grossman's human capital model [33, 34]. This model conceptualises health as a capital stock variable that is the output of a production function, and health care as one of the inputs that can increase that stock over time. Empirical studies of the demand for health care have shown consumption of services to be sensitive to price and individuals' income [35, 36]. Ensor defines demand as determined by factors at the individual level, community factors and prices [37]. He also provides a framework for analysing access to health care in terms of supply and demand side barriers. Demand side barriers are: information on health care choices/providers; education; indirect consumer costs (distance costs and opportunity costs i.e. waiting and treatment time); household preferences; community and cultural preferences, attitudes and norms; price and availability of substitute products and services. On the supply side he identifies: input prices and input availability (wages and quality of staff, and price and quality of drugs and other consumables); technology; management/staff efficiency. Barriers that are interactions between the supply and demand side are: direct price of service of a given quality (including informal payments) and quantity rationing.

Muela and Aye identify additional factors related to the utilisation of services: Firstly, social networks and solidarity can affect the price faced by the individual patient [38, 39]. Secondly, the type of payment mechanism (such as cash, credit, payment in kind, etc.) will affect the choice between providers. Typically the formal government health sector will only accept cash payments at the time of service, whereas the private and traditional health sector may be more flexible in the payment mechanisms they accept, thus increasing access

to the latter types of health services in times of need. The perceived aetiology of the disease will also influence health-seeking behaviours [40]. Though quality of staff is included above, technical skills and their interpersonal qualities should be explicitly differentiated as the latter was shown to be particularly important in service utilisation [41]. This could be expected to be even more important for stigmatised services such as treatment of and protection from STIs.

During the 1990s user fees were implemented throughout Africa as part of many macro-economic recovery plans calling for decentralisation and as a way to improve sustainability and quality of services. Many studies of the determinants of demand followed. To study the impact of these fees on demand, empirical studies of changes in utilisation of health services following introduction or removal of user fees in Africa confirm the barriers presented by Ensor above [42, 38, 43-46, 40, 47-52, 39, 53-62] [41].

In general, the impact of user fees on service utilisation differed widely from country to country. Most studies showed a decrease in utilisation of services by the very poor, despite official policies to protect the poor, because the implementation of means testing and fee waivers proved difficult [63]. Only if the implementation of user fees was accompanied by large improvements in quality did utilisation not drop [64]. In the next section we discuss a framework for introducing contraceptive methods in terms of factors relating to the services, to the product and to the user. This framework is subsequently used to organise the literature review of the demand for reproductive health services and products and barrier methods for HIV prevention.

2.3. A framework for introducing new contraceptive methods

The previous section briefly reviewed the determinants of the demand for health services. This section presents an existing framework for facilitating the introduction of contraceptives and then raises specific issues around the uptake of reproductive health goods and services.

During the 1990's, after three decades of experience introducing new contraceptive technologies in developing countries, the World Health Organisation (WHO) reviewed introduction strategies for contraceptives to revised its strategy. This 30-year history has highlighted the shortcomings of a technology-driven single method approach distributed through as many channels as possible, and has taught the importance of taking the broader social and institutional contexts into account in the development of strategies for

contraceptive introduction [65-67]. The WHO Strategic Approach provides a framework to move away from a product-driven approach and emphasises the interactions between the users, the service and the technology (Figure 2.1) ([68] p83).

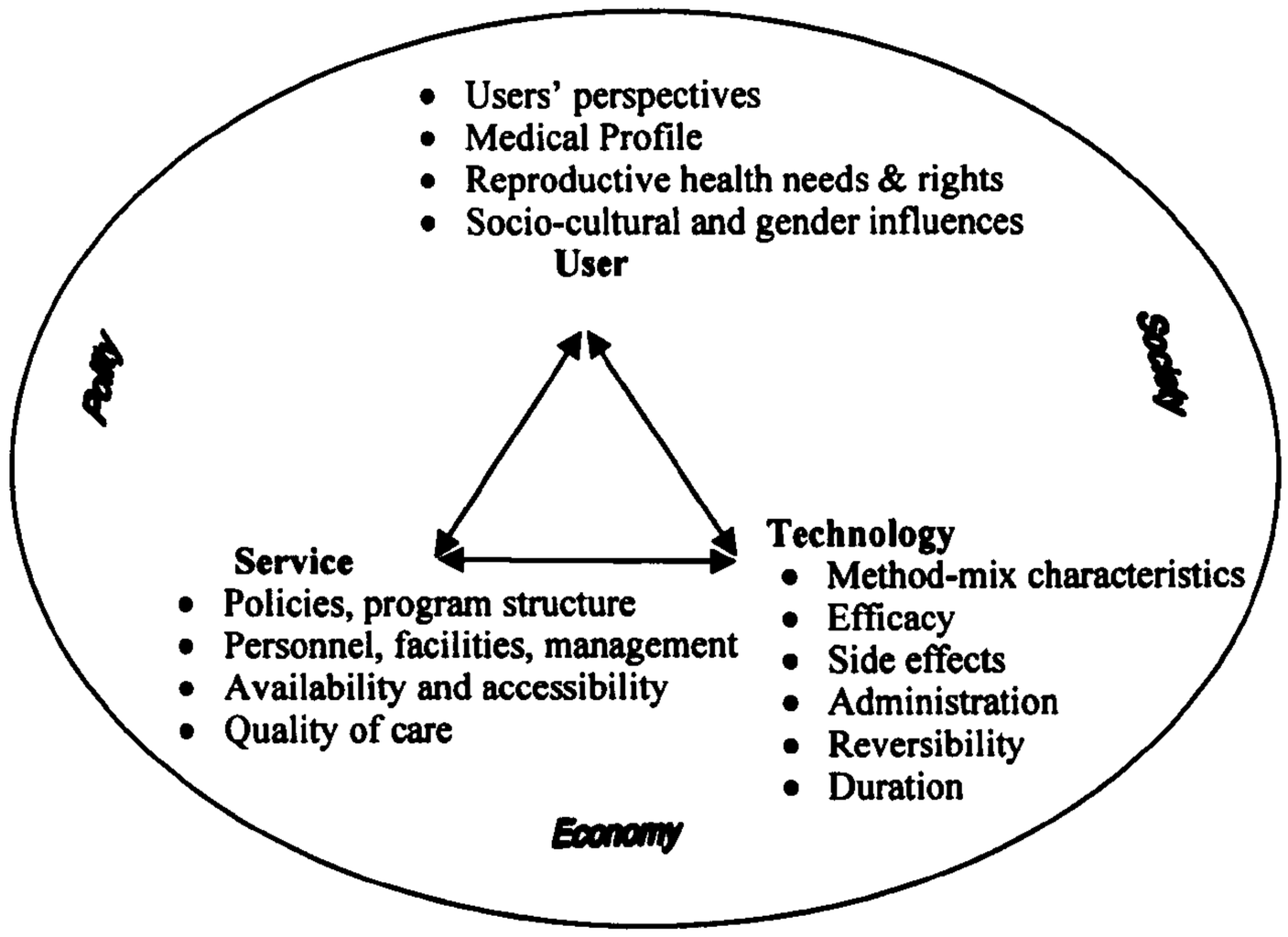


Figure 2-1 Systems framework guiding the strategic approach to contraceptive introduction

In response to research showing that contraceptive prevalence increases with the range of methods provided, this framework focuses on method-mix. The process of introduction has three stages: Strategic assessment of need; Research; and Use of research for policy and planning. These stages are flexible, interactive and have participatory potential with local actors. Though it generally has provided a useful framework, there are challenges in its implementation [69]. Using the framework above, the literature covering determinants of demand for family planning goods and services is reviewed.

Studies of the determinants of women's acceptance/use of different contraceptive methods were undertaken as early as 1940 [70]. More than half a century later this is still a productive area of research. Detailed insights into user preferences for product attributes tend to be obtained through focus group discussions. Repeated rounds of national demographic surveys such as the Demographic Health Survey (DHS) have facilitated rigorous quantitative analysis of demand determinants at individual, community and service levels (e.g. Chen; Steele; Frankenburg; Burgard; Steele; Magadi; Chayovan) [71-77]. Preferences for contraceptive technology attributes have also been investigated [12].

2.4. Determinants of at the service level

At the distribution system level, studies in family planning have shown that increasing contraceptive choice and improvement of other supply side factors has led to increased contraception use [75, 76, 74, 78, 79, 69, 80, 73, 81-83]. Chayovan defines accessibility of contraceptives as the amount of effort required to obtain them [72]. He presents this effort in nine dimensions: absolute and relative distance to contraceptive outlets, absolute and relative travel time to outlets, range of services provided, maturity of services and outlets in that community, convenience of transport to outlet, quality of service (waiting time, the technical and interpersonal skills of the staff), and the cost of the service. However, the study is methodological, and does not show results in terms of the relative importance of the different dimensions. More concretely, the key distribution strategy attributes that have been shown to facilitate contraceptive and barrier method uptake are: staff attitude, waiting time, opening hours, privacy of service, reliability of stock, price, distance to services, and media attitudes [84, 65, 85-89] [90, 91].

The other quantitative studies show that contraceptive prevalence increased with improved contraceptive supply, training of providers and IEC in Tanzania [73]. In Rwanda, personal communications about contraception at health centres reduced unmet need [92]. It also increased with the availability of a wider range of contraceptive technologies (although this did not lead to much substitution between the methods) and closer distribution sources in Morocco [76]. Steele also showed a selection effect of users choosing public versus private service providers [77]. As the quality of government services improved, their use increased relative to the community health posts; as increased field worker visits drew clients to the community health posts and away from government clinics, the inverse relationship was found with community health post prices [74].

2.5. Determinants at the user level

At the user level, partner types and pregnancy preferences are frequently mentioned as important factors influencing use. Individuals tend to underestimate their risk of HIV and STI [93-97]. Women who desire pregnancy are less likely to use existing barrier methods to protect themselves against infections [98-101].

In South Africa DHS data were used to compare contraceptive use in pre- and post-apartheid periods across racial groups and found little change in use patterns [71]. Kleinschmidt found that condom use in South Africa was determined less by lack of knowledge or difficulties accessing condoms, than by personal and partner characteristics

and attitudes [99]. This was reconfirmed in a recent study in Rwanda [92]. Specific preferences and concerns related to barrier methods are also shown to vary by life-stage, culture and other contextual factors [102-104] in [105].

2.6. Determinants at the product level

Studies of user preferences for women's barrier methods for HIV prevention are many, and have tended to focus on preferences for product attributes. There are more than 100 studies of acceptability/user preferences for the female condom cited in number of reviews [106, 66, 107-109] as well as over 75 published pieces on microbicides (or placebo products) with many more presented as conference abstracts [110, 108, 111-127]. A smaller but growing number of studies on diaphragm acceptability have been published [128, 129, 17] [130-132, 116, 133-144] [136, 145, 146]. Focusing on technology attributes, these studies have shown that women are interested and willing to use new methods for HIV prevention [147, 129, 148-151, 108, 142, 95, 110, 152, 153, 143, 154].

In Mexico women identified contraceptive method effectiveness, lack of amenorrhea and other side effects as the most important attributes [12]. Reactions to female barrier methods were the least positive with women expressing concerns about their inconvenience in terms of insertion, disposal (female condoms and sponge) and cleaning. They predicted that female condoms would be as unacceptable to their partners as male condoms. However, covert use was not a priority, though it was considered useful for 'some women'. Internationally, the lack of methods that women can use without their partner's consent has been a critical motivation for developing microbicides. Yet, participants in the MDP trial of microbicides efficacy have overwhelmingly informed their partners of their participation, and expressed the need for *discreet* products rather than secret products [155]. Just over half (54%) of women in a diaphragm safety and efficacy trial had disclosed at their six month follow-up visit [135]. Naturally self-selection of trial participants means they are unlikely to be representative of the population as a whole.

Product introduction lessons from the female condom

Female condom introduction can provide important insights to guide introduction strategies for other new methods. Warren et al. summarised key factors to successful female condom programming in Box 2-1[65].

Box 2-1 Key elements of a quality female condom distribution programme

- An identified target audience to whom the messages and product are well delivered to ensure that users have a consistent supply;
- Training for providers to ensure that possible provider biases do not negatively influence potential users;
- Face-to-face communication to equip potential users with information and skills;
- A broad reproductive health focus that integrates family planning and HIV/AIDS prevention;
- A mix of public and private sector distribution; and

In a study of lessons learned from the female condom, Kaler interviewed key stakeholders and found that: champions at all stakeholder levels are critical; there is a need to move quickly to large scale distribution rather than numerous pilots and acceptability studies; the female condom needs to be positioned by status attributes (glamour) rather than protective attributes; talking about sex and HIV prevention, an important part of female condom programmes, have public health benefits in themselves, yet are hard to measure; no quick fixes should be expected as it takes time for products to be adopted; and evaluation after one to three years is not sufficient for the product to take off [107]. In a very short (2-month) evaluation the impact of an intervention on female condom uptake in Zimbabwe, Napierala et al showed that liking of the female condom increase with use over the 2 month period, but that the female condom remained a niche product adding important protection for some women, while adding an additional tool to those mixing barrier methods[156]. Madan reviews the female condom programme in Zimbabwe and reminds us that it is the programme, not just the product, that determined the success of the female condom and that it is not a magic bullet solving all problems, including gender imbalances [67]. Brown expanded this to include lessons from the female condom, IUD and contraceptive implants, providing 12 lessons: set realistic targets for uptake and impact; cost-effectiveness is important for policy makers' decisions; make a choice of methods available to accommodate different and changing user needs; ensure strong and sustained project support at all levels; plan in the long term as it takes time to establish supply and demand for new products; respond quickly to real or perceived user problems; avoid stock-outs; consider the local context in product positioning; an integrated approach is likely to be more sustainable than vertical programmes; plan for scaling up; second generation products may give new opportunities; expect the unexpected [157].

2.6.1. Willingness to pay

Four studies have elicited women's WTP for microbicides [158-161][3]. Of these, three produced estimates for South Africa. Hill estimated that at five times the price of a condom, 52% of respondents would still be interested in using microbicides, increasing to 63%, and 79% as microbicides decrease to two times and one time the price of a condom, respectively. Becker, on the other hand, asked providers for how much they thought microbicides could be sold [158]. Providers stated that 30 Rand would be appropriate, which is approximately equal to the price of STI treatment. However, community members mentioned that condoms are free, and therefore a maximum price of 5 Rand would be the correct price. Cohen used conjoint rating to gain insights into the valuation of single use versus reusable microbicides [159, 119]. Respondents in her study from the Dominican Republic and South Africa stated that they preferred the more expensive one (5 Rand) to the less expensive one (2 Rand), holding other attributes constant. This suggests microbicides may be a Veblen good (see page 36).

2.6.2. Substitution away from male condoms

Although the efficacy of new barrier methods will only be known when trial results become available, it is likely that in their first generation they will not provide the per sex act protection that male and female condoms provide. Policy makers have been concerned about substitution; this could be a switch from using nothing to using one of the new methods (socially desirable), or it could be a change from using condoms to a new method (socially undesirable). Foss et al. showed that an individual's level of protection from HIV is not only determined by the method of protection used, but also the consistency of its use (use-effectiveness) [162]. This can be addressed by promoting new methods within a mix of methods and using hierarchical messages [87, 163]; and within programmes providing risk reduction interventions [164]. Studies exploring substitution between male and female condoms have generally shown: some substitution, though there are higher numbers of overall protected sex acts; a mixed impact on STI incidence; and in some locations increased male condom use due to women's improved bargaining power [165-171]. Studies of substitution from condoms to spermicides show mixed results [162, 172, 173]. No study has estimated the influence of prices on these substitution rates, with the exception of estimates of sex-worker price differentials between condom-protected and unprotected commercial sex acts in India and South Africa [174, 175].

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[3] Yong Holt (2002) used conjoint rating to estimate trade-offs between microbicide attributes, but did not include a cost attribute [123].

2.7. *Determinants of demand in the context of South Africa*

South Africa has experienced a decade of transformation in all areas of society and government infrastructure since the end of Apartheid. Reproductive health services have undergone dramatic changes: from parallel systems for whites and non-whites and many vertical programmes, to an integrated system focused on primary health care [71]. During Apartheid family planning was aggressively promoted as a means to reduce the size of the black population [71]. This, together with many other Apartheid policies, has contributed to a strong mistrust of the motives of many government services.

Contraceptive prevalence is far higher than the rest of Sub-Saharan Africa, with around 64%-84% of women using some modern method. Hormonal contraceptives were especially promoted among the black population, as a long term method that was not reliant on regular supplies, and which could be delivered through mobile clinics to remote areas. In 1998, 62% of black women were using modern methods such as injectables, compared to only 4% of white women. Method choice was not often provided to black women [176] in [71]. More recently, injectables have been mentioned as a contraceptive method that can be used covertly, and have been promoted with the idea that they reduce poor compliance [177].

The South African government has shown commitment to providing barrier methods through the public sector, distributing over one million female condoms a year [178]. The strategic approach mentioned above was followed to introduce the female condom and emergency contraception in the past decade. The female condom introduction has been scaled up from an initial 15 pilot sites in family planning clinics to 350 sites in the public sector clinics, workplaces and other hotspots [65]. The female condom has also been distributed through social marketing in private sector outlets [65]. A participatory providers' training was developed to prepare the providers with the skills to introduce female condoms [179]. This is critical to successful introduction as provider attitudes have been shown to limit contraceptive choice and they are key gatekeepers in introducing new methods [179, 177].

Reuse of the female condom has been reported in many developing countries [180]. In South Africa, a study of the acceptability of reuse among mostly sex-workers found high acceptability and ability to follow reuse safety guidelines [180].

Dual protection is also part of the South African reproductive health policy. Dual protection is the use of methods to prevent both pregnancy and disease by using either one method for each aim (e.g. a condom plus hormonal contraception), or a method that

achieves both (such as the male or female condom alone). Three published studies look at the determinants of use of dual protection in South Africa [99, 181, 182].

Reported dual protection was used in 10%- 12% of the most recent sex acts. Individual determinants for not using condoms were: less education, older age, rural residence, married or cohabitating (in contrast to casual/occasional partner), only one partner (compared to more than one), not fearing pregnancy (compared to being pregnant, intending to become pregnancy or infertile), knowledge of only one purpose for the condom (pregnancy or STI prevention rather than both). "Dual method use, rather than being a consensual choice, generally occurs only when a man's aim of protecting himself from STIs coincides with his female partner's goal of preventing unwanted pregnancy" [183]. Public or private distribution channels used for contraceptives did not significantly affect condom use. However, problems with access to condoms did significantly affect certain population groups, including youth, rural women, those with non-regular partners, and poorer households [99].

Information failure is widespread, especially among the youth. A review covering the 1990s showed that young people lacked correct information on methods to prevent HIV/AIDS, and side effects of condoms [96]. They also underestimated their risk, including those who were already HIV positive [184]. Men showed higher rates of denial of risk than women [185].

Men's attitudes towards microbicides are generally positive, though they express concerns about interference in sexual pleasure, including concern about the additional lubrication they provide [186]. Reinforcing the finding by Myer [183], men expressed a preference for a microbicide that would only protect against STIs over one that would only protect against pregnancy. Fifty-four to seventy-five percent of men stated a willingness to pay for a microbicide; STI clinic patients showed the least WTP and university students showed the most.

A qualitative study among policy makers, community members (potential users) and health care providers showed that HIV-prevention efficacy was important, but it was understood that even a microbicide with a 40-70% effectiveness against HIV would be of great value, given the low levels of condom use at present [158]. Preferences for contraceptive microbicides vary widely, emphasising the importance of having two formulations to meet different people's preferences. Though broad-based distribution was deemed appropriate, it

was thought that, initially, distribution channels should be restricted to channels where personal counselling of hierarchical messages is feasible.

Reproductive health in South Africa cannot be discussed without raising the issue of gender relations and violence. There are strong double standards, where extramarital affairs by men are often accepted and condom use within marriages remains low [187]. Married men are more likely to be HIV+ than women, suggesting that they are more likely than the women to bring the infection into the relationship [187]. Covert use of barrier methods are attractive to women, however they also reported fear of violence if discovered [144, 187]. Sex is frequently associated with coercion in South Africa [188, 189] in [190]. Not only is rape common, women are also disadvantaged economically [191]. In urban South Africa, transactional sex and partner violence are prevalent [192, 193].

2.8. Lessons from review of determinants of demand

Despite many studies on user preferences, there are still gaps in the literature around how factors, beyond the specific method attributes, influence use. These include individual characteristics such as partner type, age, and desire for pregnancy; as well as supply side factors such as how distribution channels and advertising affect the demand for barrier methods for HIV prevention [194, 103, 195, 106, 108], and the trade-offs between them. This information is important to enable interventions to be developed in low and middle-income countries that meet women's needs for HIV prevention by facilitating access and stimulating demand. Moreover, none of the studies have quantified the trade-offs or interactions between the different characteristics of technologies and distribution systems, which is needed to inform introduction and distribution strategies.

Chapter 3. Economic theory of demand

3.1. Introduction

This chapter will begin with a review of the neoclassical theory of demand. Since the goods considered here are not entirely private goods, the theory of externalities and public goods will be discussed, followed by theories of the demand for new products and strategies to increase demand.

3.2. Neoclassical demand theory

3.2.1. Consumer theory

Neoclassical economics theory of demand considers the perspective of individual consumers who make choices to maximise their wellbeing (utility). By maximising their utility, consumers are expressing their preferences. Consumers are assumed to be rational agents, and their preferences are assumed to conform to a number of axioms: they are complete, reflexive, and transitive. Completeness means that *all* bundles of goods can be compared and ranked to assess which bundles are preferred and which are considered equal. Reflexivity means that a bundle is preferred equally to the same bundle (itself). It should be noted here that a good has both a time and a space dimension and if one of these changes, it is no longer conceptualised as the same good. These changes in valuation of goods will be quantified in our analysis of valuation of distribution channels. Transitivity means that if A is preferred to B and B is preferred to C, then A must also be preferred to C.

A number of assumptions are made about 'well-behaved' preferences. They are *monotonic*, that is: more is better. Although satiation can occur, we assure that demand is evaluated at quantities less than the satiation point. We also assume that combinations of goods are better than only one or only the other. Preferences are graphically represented in indifference curves, representing different amounts of bundles of goods that provide the same amount of utility (make the consumers equally well off). They are mathematically represented in the utility function $U=f(x_1, x2)$, where utility (U) is a function of the consumption of different goods: good 1 (x_1) and good 2 (x_2).

These assumptions about preferences guide the shape of the indifference curves. Monotonicity implies that the slope of the indifference curves is negative. Curves further away from the axis are better. The preference for combinations of goods rather than extremes dictates that the curve is convex. The slope of the curve represents the marginal

rate of substitution between the bundles. The marginal rate of substitution shows how much of one good or bundle of goods one is willing to give up to obtain a given amount of the other good. This can also be seen as the marginal 'willingness to pay' to buy the other good. Convexity of the indifference curve implies a diminishing marginal rate of substitution. In other words, the consumer would be willing to trade less of x_1 for a given amount of x_2, the less they have of x_1 (moving to the left on the indifference curves in Figure 3-1). The closer the marginal rate of substitution is to -1, the easier it is to substitute between the two goods; the closer to 0 indicates that the goods are more complementary (the consumer needs some of both goods to make them happy, rather than either one or the other as in the case of substitutes).

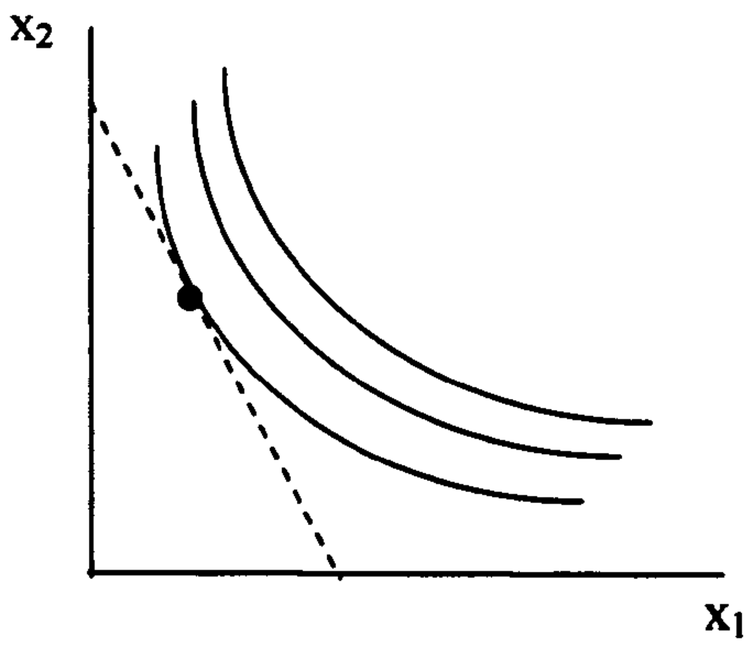

Figure 3-1 Indifference curves

Although a consumer is equally well off at each point on a given curve, relative prices and the consumer's budget determine the utility maximising consumption point, that is where the ratio of prices is equal to the marginal rate of substitution . The quantity of a good demanded (Q_1) is then a function of the consumer's income (m), the good's own price (p_1) and the price of its substitutes (p_2):

$$Q_1=f(p_1, p_2, m). \qquad \textit{Eq. 3-1}$$

Underlying this function are the consumer's preferences (represented by his/her utility function).

The demand curve represents the relationship between the price of a good and its demand and shows the utility (benefit) gained by consuming consecutive quantities of a good. It is downward sloping, showing how the first unit of a good tends to provide more utility and is valued higher than further units. At a given price (p*), a consumer will purchase the amount of the good at which their marginal benefit from the unit of good is equal to the

marginal cost of purchasing that unit good (the price). At this point the consumer has obtained more benefit for each previously purchased unit than they have paid. This surplus benefit is called consumer surplus and is represented in Figure 3-2 as the shaded area above p* and below the demand curve. The demand curve also represents the consumers 'marginal willingness to pay' for each unit of good because each point on the curve measures what the consumer is willing to pay for the last unit.

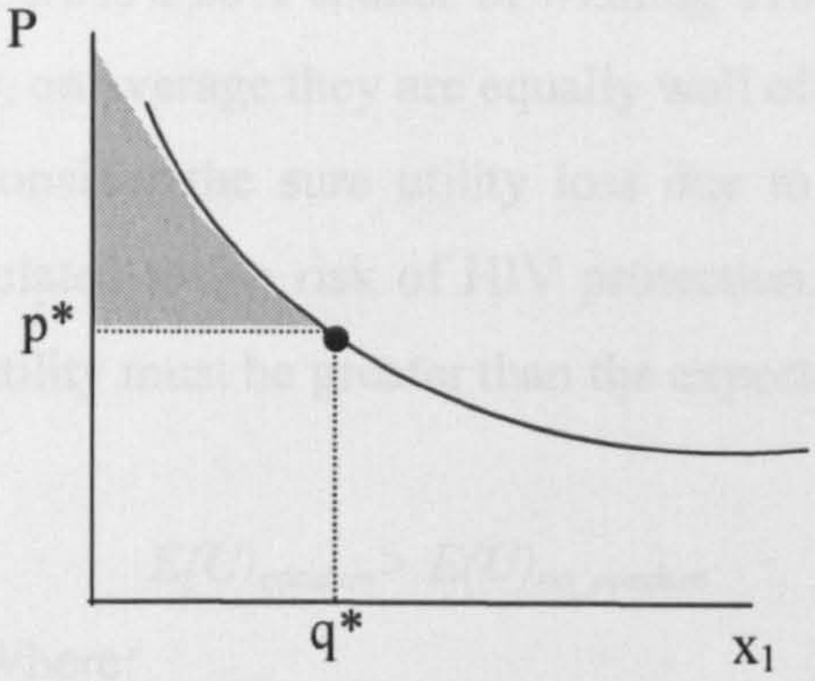

Figure 3-2 Demand curve

The responsiveness of demand to changes is captured by a unit free measure called "elasticity". This was developed as a measurement of responsiveness, and allows for responsiveness to change at different quantities. Common demand elasticities are price, cross-price and income, but demand elasticities can also be measured for the responsiveness of demand to other stimuli such as advertising.

Formally, elasticities are measured by: $\frac{\%\text{ change in the quantity demanded}}{\%\text{ change in the stimulus}}$

Demand is said to be elastic when it changes by a greater percentage than the percentage change of the stimulus, and inelastic when it changes by a lesser percentage. Elasticities can help to understand the impact on demand of actions like taxes and subsidies that change prices faced by consumers. For example, Townsend showed the impact of increasing cigarette prices on smoking in different socio-economic groups and shows the sin tax is highly regressive; and Kondo showed how the vaccine subsidies have little effect on vaccine uptake in urban areas, but are quite effective in rural areas in Japan [196, 197].

Basic utility theory has been extended by von Neumann and Morgenstern to include uncertainty [198]. Expected utility theory states that people make decisions and choices to

maximise their expected utility, incorporating the probabilities of the different outcomes. In the case of perfect substitutes, for example, expected utility (E(U)) can be represented by the following function: $E(U)=f(\pi_1 x_1+\pi_2 x_2)$ where π_1 and π_2 are the probabilities of getting x_1 and x_2, respectively. This is easiest to think of in terms of entering a lottery, but can also be thought about in terms of HIV risk. If we ignore the impact of risk preferences and diminishing marginal utility of money, then an individual would enter a lottery if their $E(U)_{enter} > E(U)_{not\_enter}$. If it is a fair lottery and five people enter and pay £2 to enter, then there is a 20% chance of winning £10 and an 80% chance of losing £2. The expected gain is 0, on average they are equally well off by entering or not. Expected utilities for condom use consider the sure utility loss due to condom use, compared to the expected utility gain related to the risk of HIV protection. To use a condom for HIV prevention, the expected utility must be greater than the expected utility of not using a condom:

$$E(U)_{condom} > E(U)_{no\_condom}$$

Where:

$$E(U)_{condom} = U_{condom} + E(U)_{avoid\_HIV}.$$

The probabilities in this function relate to the probability that the condom will prevent an HIV infection ($E(U)_{avoid\_HIV}$), and thus to the probability that: she is not HIV infected herself and her partner is HIV infected; and the per sex act transmission probability.

However, observed choices are often seen to not adhere to the axioms of expected utility theory. Kahneman and Tversky explained this in their seminal paper on Prospect Theory, which explains how attitudes towards risk affect choice, with different valuations for expected gains and losses [199]. The implication of this for the example above is that expected utility of using a condom will be perceived/ evaluated differently if presented as a 95% chance of remaining HIV negative or as a 5% chance of becoming HIV infected.

3.2.2. Aggregate demand[4]

At the market level, individuals' demand and consumer surpluses can be aggregated to obtain the market demand for a good and the aggregate consumer surplus[5]. However, aggregate demand is not simply the relationship between prices and aggregate (or average) income, because demand is a function of the specific income levels of individuals. Therefore aggregate demand is a function of prices, aggregate incomes, and income distribution [201].

[4] Based on Mas-Colell, et. [1995], Chapter 4 'Aggregate demand'[200].

3.2.3. Market equilibrium

In a perfectly competitive market, consumers will continue to trade goods with each other to the point where their marginal rates of substitution for all goods are equal. This is a competitive market equilibrium[200]. At this point no consumer can be made better off without making someone else worse off. This is called a *Pareto efficient* allocation of goods, and is known as the First Welfare Theorem. The Second Welfare Theorem says: when consumers have convex preferences as described above, each Pareto optimal allocation will correspond to a set of relative prices that represent a relative scarcity of goods, and has a market equilibrium. Each distribution of income will have a new market equilibrium and new Pareto optimal allocation of resources. When markets are not competitive, people are not only concerned with their own consumption, but with that of other consumers (externalities). Or if consumers are not price takers, the market may not lead to Pareto optimal resource allocations: government intervention may lead to improved efficiency. This is discussed in more detail in Section 3.2.4

3.2.4. Externalities

Externalities and public goods

Externalities are direct benefits or harm to one person resulting from another person's consumption or production[24]. That means that the marginal private cost or benefit is not equal to the marginal social cost or benefit, and that the market, left to its own devices, will not come to the optimal consumption/production of the good. Often these market failures can be rectified by correct assignment of property rights. In the case of public goods this is not possible. Public goods are goods that are non-rival and non-excludable. Non-rival means that consumption of the good or service by one person does not reduce its consumption by another. Non-excludability means that either people cannot avoid consuming it, or be prevented from consuming it, or the cost of excluding consumption is unacceptably high. Thus all people consume the same quantity of the public good. Left to the market, a good with a positive externality would not be provided as the costs of provision could not be recovered. The only efficient form of provision of a pure public good is public provision, where the cost of providing it can be centrally and involuntarily collected through taxes, thereby alleviating the free rider problem. The problem is then how much of the good to provide. The efficient level of provision of the public good is where the marginal social benefit is equal to the marginal social cost. The total marginal

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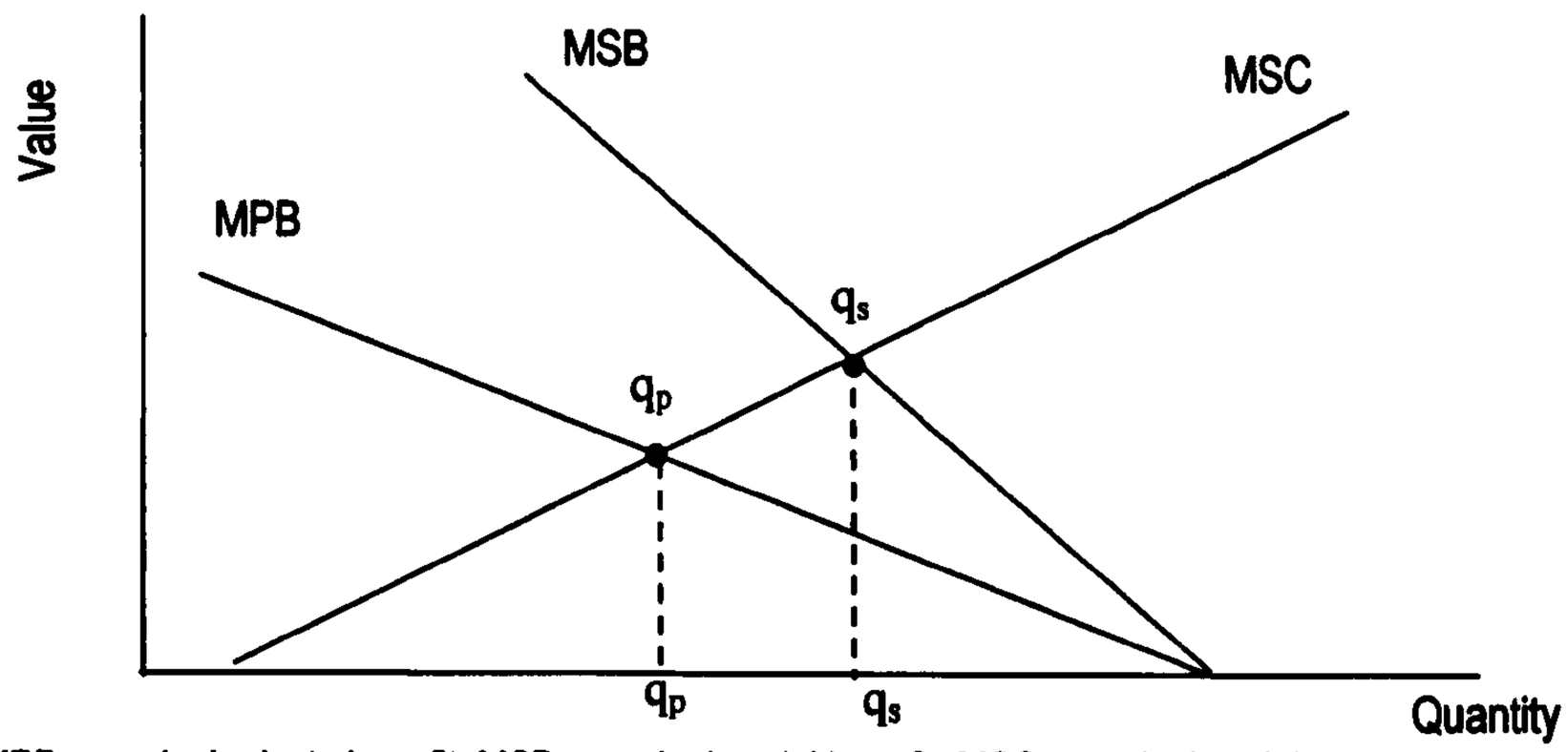
[5] The assumption of additivity only holds for goods with no externalities.

social benefit is the sum of the individual marginal benefits, which is the sum of all individuals' marginal willingness to pay.

Although there are a few examples of pure public goods (such as global environment and defence at a national level), most goods with public good characteristics also have private good characteristics (the air was traditionally cleaner on the west side of UK cities due to the direction of the wind blowing industrial pollution eastwards, it is not a coincidence that housing was more expensive to the west). Lancaster calls these mixed goods or impure public goods [25]. He shows that both public and private provision of mixed goods leads to inefficient levels of provision, below the optimal level. The socially optimal level of provision is accomplished through an appropriately subsidised price, leading to both private and public expenditures on the good. However, in the absence of the appropriate subsidy, public provision is closer to the social optimum than private provision.

With infectious disease prevention, this means that a person using something to prevent contracting a disease (a barrier method for HIV prevention) will only value the private characteristics (benefit) of prevention to themselves and not the public characteristics (social benefit) of preventing secondary infections. Therefore the marginal private benefit will always be less than the marginal social benefit. This is graphically represented in Figure 3-3.



MPB: marginal private benefit; MSB: marginal social benefit; MSC: marginal social cost

Figure 3-3 Externalities

The lower prevalence faced by society as a result of fewer secondary infections is largely non-rival and non-excludable (unless abstinence is feasible). The implications of this are that the demand for HIV-prevention will be lower than socially desired, and the market equilibrium will not lead to a Pareto efficient allocation. This calls for interventions to

stimulate demand. Supply side strategies that could play a role in stimulating demand will be discussed in Section 3.5.

Other relevant externalities[6]

The externalities discussed above focus on the functional attributes of barrier methods for HIV prevention in terms of their disease prevention capacity. Many goods also have non-functional attributes which contribute to the utility derived from them. Non-functional attributes with externalities are discussed here, i.e. those effects on demand that are dynamic and interpersonal in nature. Although often assumed away in economics because of their complexities, non-functional attributes have been recognised as an issue since the development of the neoclassical theory around the turn of the 20th century. There are three types of non-functional external effects on utility:

1. The bandwagon effect: where the demand for a commodity is *increased* due to others consuming it (being part of a group, keeping up with the Joneses);
2. The snob effect: where the demand for a commodity is decreased due to others consuming it (showing difference from a group); and
3. Veblen effect: where demand increases for the commodity because it bears a higher price (conspicuous consumption).

The bandwagon effect is where people want something because specific other people also have it, such as 'Madonna glasses', where in the 1980's all the teenagers were wearing a specific style of sunglasses initially worn by Madonna; another such commodity is the washable nappies among 'environmentalists'. In health behaviour one can think of trendy sports, such as jazz dance in the 1970's, calenetics in the 1980's and Pilates in the 1990's, and smoking habits, which are very fashion sensitive. Although using barrier methods for HIV-prevention may appear to be a private activity, there is evidence of the snob effect in particular related to barrier method use. When the female condom was introduced, it was initially targeted at sex-workers. This targeting led to the stigmatisation of female condoms as a product used only in commercial sex acts. Thus the targeting (which was not necessarily related to use) of female condoms to type of sex act led to a drop in its demand for other types of sex acts. Anecdotal evidence of the Veblen effect has also been reported in South Africa, where purchasing an expensive condom confers a higher value to the sexual encounter. The implications of the snob effect are that consumers need to perceive that others in their consumer group are consuming the product (the bandwagon effect), but

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[6] This section draws heavily on: Liebenstein (1950) [202]

that it is not being consumed by other groups (the snob effect). Another implication is that a range of commodity prices may improve welfare solely due to their relative price differences. In practice it may be difficult to distinguish the snob and the Veblen effects. Marketing has been successful in applying these theories to the practice of product differentiation in order to reach different consumer groups, and supplying commodities at different prices (i.e. price discrimination, more in Section 3.5.). We will now move from the traditional neoclassical economics framework to Lancaster's theory of demand, which is particularly helpful when studying new goods or services.

3.3. Lancaster's theory of demand [7]

Lancaster's theory of demand was developed in reaction to the concept of goods held by traditional neoclassical economics. Traditionally, goods had a circular definition: 'goods are what are thought of as goods' (Lancaster (1966), p132[25]). There was no way to account for the fact that some goods were more similar than others. There was also no way of predicting preferences and demand for new goods or quality variations. In Lancaster's seminal paper 'A new approach to consumer theory', he introduced a new notion of goods, as being part of a production function of utility, rather than direct sources of utility. More specifically, a good is an input providing characteristics, of which the valuation is the output, i.e. utility.

Box 3-1: The essence of the new approach

1. The good, per se, does not give utility to the consumer; it possesses characteristics, and these characteristics generate utility.

2. In general, a good possesses more than one characteristic, and many characteristics are shared by more than one good.

3. Goods in combination may possess characteristics that are different from those pertaining to the goods separately.

From: Lancaster, 1966, p. 134 [25].

[7] This section draws heavily on Lancaster's 1966 paper 'A new approach to consumer theory'. [25].

The characteristics of goods are objective across consumers, i.e. they provide the same characteristics to all consumers, but the valuation of these characteristics can vary among consumers.

The model can be described as follows:

- Goods (x) or combinations of goods are consumed in activities (y);
- Activities provide characteristics (z);
- Utility is a function of these characteristics.

$x=Ay$, where A is the vector of goods required for the vector of activities.
$z=By$, where B is the vector of characteristics provided by the activities.

Assumptions are that x has a linear and objective relationship (via vector A) with y, and y has a linear and objective relationship (via vector B) with z. Objectivity means that these vectors hold for all consumers.

Utility is then determined by the valuation of the characteristics by individuals U(z). Utility has the standard properties of the utility function described earlier, but is indirectly determined by consumption of goods rather than directly. The consumer faces the following choice, subject to the budget constraint (k):

Maximise U(z)

$$\text{Subject to } px \leq k$$
$$\text{with } z = By$$
$$x = Ay$$
$$x,y,z \geq 0$$

Activities are analogous to services, which are made up of sets of goods and are the source of characteristics. This can be simplified by the assumption that goods and activities have a one-to-one relationship, such that $z=Bx$. From here onwards, this assumption will be maintained. Utility can be described in terms of goods, and the budget constraint can be linked to utility, but only through the transformation of characteristics to goods and vice versa, respectively. Central in this approach is the role of this transformation ($z=Bx$), and the properties of B, the transformation matrix also called the *consumption technology* of the economy and consumer behaviour. B is a matrix of constants and $z=Bx$ is linear. These properties make it possible to obtain a unique solution to the maximisation problems faced

by consumers. The structure of the matrix also formalises relationships between goods, in terms of substitutability and complementarity. Intrinsic commodity groups are groups of goods and characteristics that have specific characteristics which can only be acquired from that set of goods, and that set of goods provides only those characteristics. In this case demand for the group can be carried out independently of the market for other commodity groups. Within intrinsically related groups, goods can be intrinsically perfect substitutes, when the two goods provide exactly the same characteristics in the same proportions (although total quantities provided may differ), or close substitutes or complements.

There are different cases of this model. 1. The number of characteristics is greater than the number of goods. Lancaster associates this with simple economies. 2. The 'complex economy' case is where there are more goods than characteristics. This is the most efficient case, as the consumer can choose between the different bundles of goods that satisfy their characteristic preferences based on price, and subject to their budget constraint. 3. The special case, when there is a one-to-one relationship between goods (activities) and characteristics, is the same as the traditional model where utility is a direct function of goods.

As with traditional theory, utility maximisation occurs where the slopes of the 'what can be purchased' line is equal to the slope of the indifference curve. In this case, what can be purchased is not represented by the price ratios, rather the characteristics frontier represents the different levels of characteristics that can be purchased, given the prices of the goods that provide those characteristics. Figure 3-4 represents the consumers' choice in case number 2, when there are more goods than characteristics. $e_1e_2e_3$ represents the characteristics frontier, e_1 represents the maximum quantity of x_1 the consumer can purchase, given the price of x_1 and their budget constraint. Combinations of goods on this frontier are technically efficient. A combination of x_1 and x_3 is not efficient, since more characteristics can be obtained for the same amount of money from combinations of x_1 and x_2 or x_2 and x_3. Conceptually, the characteristics frontier is equivalent to the production possibility frontier in production theory. Consumers can consume anywhere along this frontier depending on preferences for characteristics. This consumer would consume a combination of x_2 and x_3 to maximise utility.

If the price of x_2 increases slightly, and the consumer's preferences are convex in characteristics, the traditional substitution effect can occur where the slope of e_2e_3 becomes flatter and the consumer consumes x_3 in larger proportions than before the price change. If the price of x_2 rises such that e_2 lies below the line e_1e_3, the consumer would switch to a

combination of x_1 and x_3. This is referred to as an efficiency substitution effect. In contrast to traditional theory, this effect is independent of the individual preferences, and can occur even in the absence of convex preferences of characteristics. The consumer can continue to consume characteristics in fixed proportions (an L-shaped utility curve) while substituting between goods.

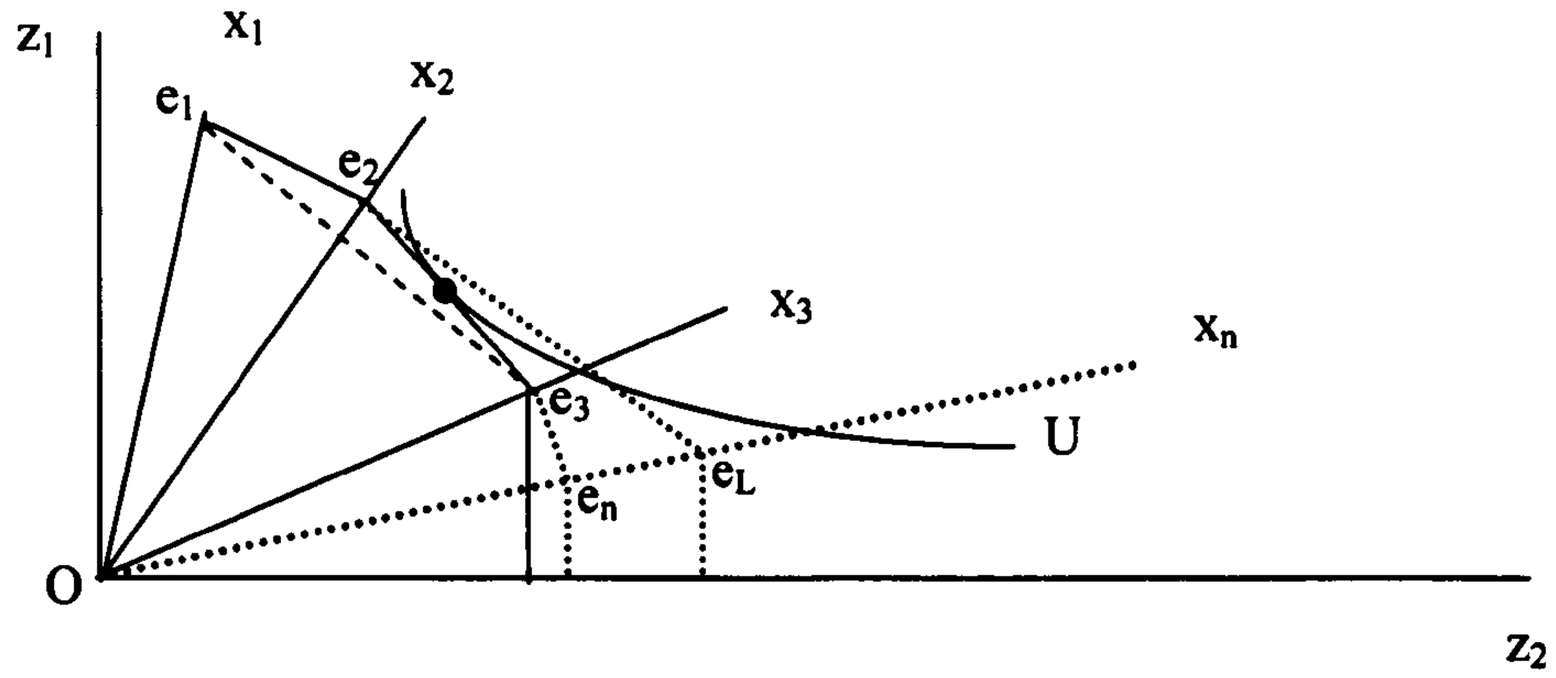

Figure 3-4 Optimal choice[8]

This provides a framework for predicting the impact of introducing a new commodity (or a newly differentiated version of a good) at different prices on its own demand and on the demand for other goods within an intrinsic commodity group. Assuming the new commodity provides slightly different proportions of z_1 and z_2, it can be represented by a new ray, x_n. If the price is too high (between the origin and the characteristics frontier), it will be dominated by the other goods and not be purchased on the grounds of technical efficiency. If the price is outside the original characteristics frontier it will provide a new point, expanding the frontier, and the demand for x_n will depend on consumer preferences. If the price was even lower (e_L) it could expand the frontier to the point where it replaces x_3.

This model also provides a more flexible analysis of choice under risk. Where expected utility theory states that people maximise their utility based on expected returns, Lancaster's approach can define characteristics by the different outcomes, such as maximum loss, maximum gain, and expected returns, so that people can have different utility weights for the different outcomes.

This framework can incorporate physical product characteristics, but also characteristics that are more similar to services, such as characteristics of distribution channels. Data for

[8] Adapted from Lancaster Figs. 1-6

estimating the B-matrix (representing consumption technology) and constructing a characteristics frontier can either be obtained from revealed market data, or from survey data. Chapter 4 reviews methods for estimating consumption technology using preference elicitation methods, but first a review of the sociology and marketing literature on the uptake of new products is presented.

3.4. Demand for new products: diffusion and adoption of innovations[9]

Lancaster's theory of demand provides a framework for estimating the valuation of characteristics of goods and services, and estimating their demand. Early diffusion theory puts the demand for new goods into a wider social context. Diffusion is commonly defined as: "the acceptance and spread of a new technology in a market or user community" [210]. The process of diffusion focuses on four areas (in italics). "Diffusion is defined as the process by which an *innovation* is communicated through certain *channels* over *time* among the members of a *social system*" [27]. An innovation is any idea, product, or practice that is new to the person or decision unit adopting it. This is a broad concept as the theory was developed by a wide range of behavioural disciplines, including rural sociology, communication studies, agricultural economics, marketing, etc. Communication channels are usually divided into interpersonal 'word-of-mouth' communication systems and mass media /advertising. Social systems refer to network interconnectedness, norms, etc.

The classic model of diffusion was introduced by two sociologists in 1943, who studied the adoption of hybrid corn by Iowa farmers [211]. During the 1960s numerous models of diffusion were developed, most popularly the adoption curve. The adoption curve shows the rate of adoption as an S-shaped curve when plotted as the cumulative number or % of adopters over time (Figure 3-5). Key in this model is time and the binary nature of adopting an innovation. Either one adopts or one does not. Initially, a small group of innovators take on the innovation. As the innovation gains popularity the curve becomes steep, after which few additional people (late adopters) adopt the innovation. Adopters are classified by their time of adoption, starting with the fastest adopters: innovators, early adopters, early majority, late majority and laggards [212, 27].

Three different innovations are shown in Figure 3-5[10]. The first innovation diffuses very quickly, and is adopted by many users. The second innovation is less quick to be adopted

but also reaches high levels of use. Innovation 3 takes the longest to adopt and levels out at a much lower level; it may be considered an unsuccessful innovation [213]. The three diffusion phases that can be distinguished by this standard model on the market side are: introduction, growth, and maturity [214]. From the perspective of consumer decisions these phases are: awareness, interest, evaluation, purchase, confirmation [215, 27].

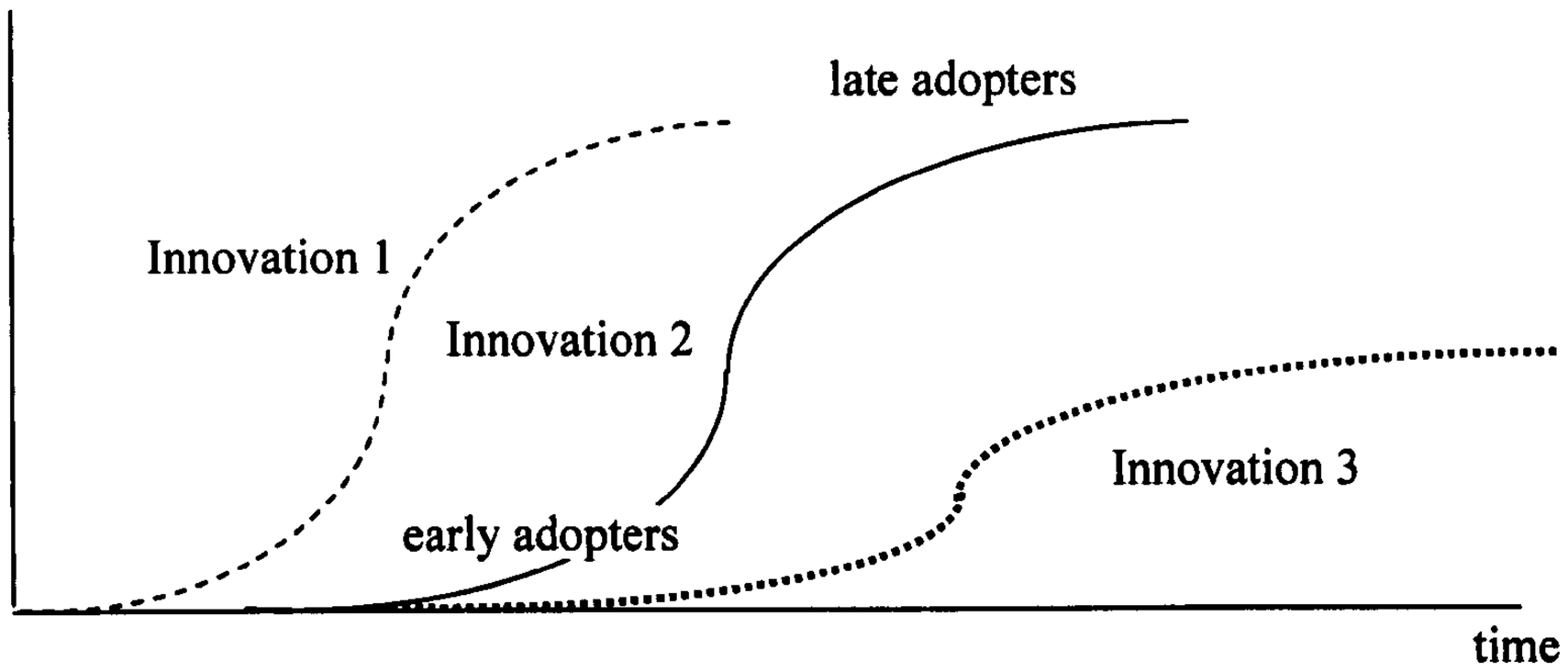

Figure 3-5 The classic diffusion model

The rate of adoption is considered linked to the other areas of diffusion mentioned above (the innovation itself, the channels of communication, and the social system) with a few additions. Rogers and Shoemaker added to these determinants the characteristics of the adopters themselves, measured by 'innovativeness'[216]. They define this as "the degree to which an individual is relatively earlier in adopting an innovation than other members of his system...By relatively earlier is meant earlier in terms of actual time of adoption rather than whether the individual perceives he adopted the innovation relatively earlier than others in his system." Rogers also added type of innovation decision and promotion effort of agents of change ([27], Chapter 6). The latter is grouped within channels of communication and includes supply side efforts to increase adoption, such as advertising. Types of innovation decisions relate to the speed with which decisions can be made. The decision to adopt can be made at three levels: 1. optionally by individuals; 2. collectively by a group; 3. authoritatively by a leader/legislator. Depending on the system, authoritative decisions tend to lead to the fastest adoption, followed by optional decisions. Collective decisions to adopt tend to be the slowest. Rogers claims that 49%-87% of variation in the adoption of

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[9] This section builds on the book: Diffusion of Innovations by E. Rogers (1995), and is supplemented by original articles. The original Rogers book dates back to 1962, this newer version is an update and remains largely the bible of innovation diffusion. New research about product diffusion builds on this seminal work within adapted frameworks for public health, see for example [203-209, 68, 66].

[10] This figure is adopted from Rogers 1995 p11 [27], and Markus 1987 p495 [213]

innovations can be accounted for by five general perceived attributes of an innovation ([27], Chapter 6):

1. *Relative advantage:* The perceived improvement of the innovation relative to existing 'substitute goods'.[11] Econo mists would call this the incremental benefit, although a lower cost can also fall into this attribute. This is expected to be positively related to the rate of adoption.

2. *Compatibility*: The extent to which the innovation is perceived as familiar (similar to existing goods), to conform to social values and to fulfil the needs of potential adopters. The image of the intervention is part of this attribute, including name and product positioning. This is expected to be positively related to the rate of adoption.

3. *Complexity*: "...the degree to which the innovation is perceived as relatively complicated and hard to use." ([27]p242). This is expected to be negatively related to the rate of adoption.

4. *Trialability*: Whether or not the innovation can be tried. This is high for frequently purchased consumer goods and relatively low for expensive durable goods. Testing a product reduces the risk and uncertainty about the benefits of a good. This is expected to be positively related to the rate of adoption.

5. *Observability*: The extent to which the benefits of adopting the innovation can be observed. This is an important attribute contributing to the slow uptake of preventive innovations. The more observable the benefits, the quicker the rate of adoption.

Interestingly, Rogers identifies general attributes, while Lancaster leaves them to be fully elicited from the potential consumers. However, due to their generality they still need operationalising by potential consumers, and are therefore consistent with Lancaster's theory of demand.

Diffusion theory has commonly been applied to model the uptake of technological innovations by firms and sellers of new products/services to consumers over time and space ([217] in [218]). We can distinguish between process innovations aimed at technological

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[11] Diffusion theory deals with innovations beyond new products or production processes, incorporating education about public health innovations and beyond. To capture this broadness, the literature refers to 'ideas'. This concept is adapted to the present context of new goods.

innovations for firms and their production processes and product innovations targeted at consumers [219].

The classic model fits conceptually well with much of the early diffusion research done in economics and marketing in the 1960s. This focussed on the rate of adoption of process innovations, particularly in developing countries. In marketing, much of the consumer diffusion research that focussed on product innovations has examined durable goods (e.g. Bass, 1969; Krishnan, 1999; van den Bulte, 2000; Tsur, 1990; Ireland & Stoneman, 1986) [212, 219-222]. This research conceptually followed the framework of process innovations and other search goods, where adopters (firms) have an initial investment to switch technologies and reap the benefits in following time periods. Adoption is then a binary choice. These models include a component of risk related to an investment type purchase. The risk of purchasing consumer durables is considered to decrease with information. The inclusion of risk involved with the purchase is of lesser importance when analysing frequently purchased consumer goods, due to their high triability. However, when the nature of the benefits of the products examined combines high triability with uncertainty of effects (HIV prevention is not guaranteed); one does not know the full individual benefit of consuming the good (low observability).

One of the most widely applied consumer diffusion models is the Bass model. This model looks at consumer acceptance and first purchases of durable goods. On the adoption curve the Bass model places sales quantity on the vertical axis rather than the number of adopters. This "sales curve" gives more flexibility in terms of applying the model to consumer diffusion processes and is more applicable to recurrent purchases, such as barrier methods for HIV prevention. This allows the incorporation of different phases of adoption and forms of the sales curve. Dodson and Muller show a variation of shapes of the sales curve for frequently purchased goods ([223] p1572-1573, Figs 4-7). They assume the shape depends on the trial and repurchase rates and a contact coefficient (Figure 3-6). The contact coefficient represents the impact of communication channels, both advertising and word-of-mouth.

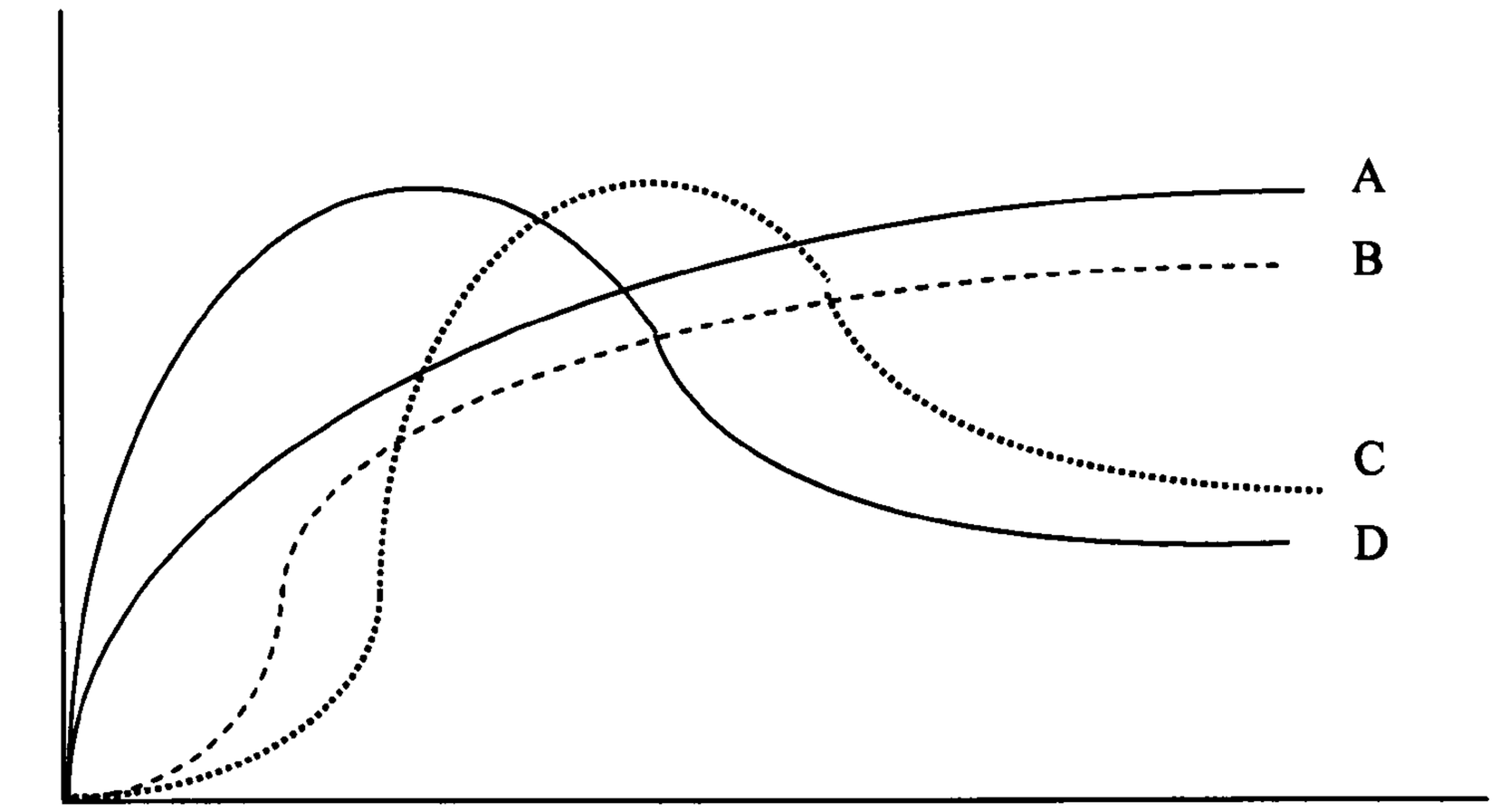

Figure 3-6 Alternative forms of the adoption curve

Curve A shows the sales curve where the repeat purchase rate is greater than the trial rate, with a relatively small contact coefficient, while curve B shows the same pattern with a large contact coefficient (this is identified by the slower initial uptake as contact takes time to introduce). Curve C shows sales when the trial rate is greater than the repeat purchase rate, with a large contact coefficient. D shows this with a small contact coefficient. The introduction of the female condom followed sales curves in the forms of C or D, with high initial sales that stabilised at a lower rate. The initial peak is novelty or trial sales.

Consumer diffusion literature also covers the area of supply side strategies for introducing new goods. This will be covered in the following section.

3.5. Supply side strategies to stimulate demand

Given the positive externalities associated with HIV-prevention and the subsequent use of barrier methods, the aim of this section is to look at ways in which intervention can increase the uptake of these goods. As shown above, individuals' demand for a product is determined by its cost, the (perceived) benefits, and of course their income. Some of these benefits are functional, related to the inherent commodity attributes, and others are non-functional, related to everything else, including who uses the products. On the cost side, direct costs (product prices) can be influenced. Some indirect costs, such as travel costs, can be affected by the distribution channels through which products are obtained. Increasing the (perceived) benefits of the products has many more dimensions. While pricing and distribution channels affect affordability and accessibility on the cost side, they also tend to affect perceived quality on the benefits side. In this section, industrial

economics and marketing theories are examined for guidance on maximising adoption and continued use of barrier methods for HIV-prevention, specifically in terms of increasing consumers' perceived benefits.

3.5.1. Targeting and market segmentation[12]

Market segmentation is the practice of dividing a large heterogeneous market of consumers into more homogenous consumer groups [225]. By doing this, products and marketing methods can be tailored to specific groups, in terms of distribution channels, product differentiation, promotion, pricing, etc. For firms, the major advantage of this is appealing to more consumers, and potentially capturing more of the consumer surplus through price discrimination. Segmentation can be based on geographic locations, age, gender, social class, psychographic characteristics, and behavioural factors, or a combination of different factors. Market segments are identified through qualitative and quantitative studies, including conjoint analysis.[226] From a private sector perspective the effectiveness of using market segmentation to target consumers depends on: ease of identification, accessibility as discrete segments, size and profitability, and the extent to which differentiated products or services can be developed ("actionability"). Although these effectiveness factors mostly apply to privately provided goods, the profitability requirement can be interpreted as effectiveness in terms of increasing barrier method use and the impact of the increased barrier method use on HIV incidence and the wider epidemic.

Once market segments have been identified, a targeting strategy must be developed. There are three main strategies to targeting:

- Undifferentiated marketing uses a single strategy to reach the widest group, ignoring the existence of market segments. This can achieve economies of scale as the level of output is greatest and all units are the same.
- Differentiated marketing uses differentiated products and services to target different market segments. This means developing products/services for different groups, which entails additional production costs such as packaging. The advantage is that the total sales are likely to be higher, and prices can also be differentiated by target group, capturing more of the consumer surplus.
- Concentrated marketing focuses on targeting specific market segments, as opposed to all segments.

[12] Based on Kotler, [1999], Chapter 9[224].

Each of these strategies has its advantages. New products tend to be introduced in a single variety, then as the market matures and demand increases the product can be differentiated to meet the different demands of the market segments. Production capacity to produce variety must also be developed.

3.5.2. Pricing[13]

In perfectly competitive markets such as those discussed in Section 2.1, all goods are homogeneous, and consumers and producers are price-takers at an equilibrium price that is equal to the marginal costs for the firms. When a product is introduced, prices need to be set and can be a choice variable. In neoclassical economics it has been shown that profits are greatest when prices are set where the price elasticity of demand is equal to (-)1 [227]. Marketing uses two techniques to set prices [224]. The first method starts at the cost of producing the good then uses a mark-up. This is cost-based pricing. Value-based pricing starts with the consumers' perceived valuation of the product (willingness to pay) and then develops/designs the product such that its cost matches (or is less than) the consumers' willingness to pay. Pricing can also take into account the product's price relative to competitor's prices for similar goods (competition-based pricing).

The other issue related to pricing of a new product is product positioning relative to substitute goods, which can be done in terms of quality or price. Pricing strategies may also change over the life of a product. Market-skimming pricing sets prices relatively high at first, selling only to those consumers with a high WTP. Then as time goes by the price is lowered step by step, capturing more of the consumer's surplus than through a single market clearing price. The opposite strategy is market-penetration pricing, where prices are set relatively low, quickly capturing a large market share, thereby enabling further economies of scale. This type of pricing strategy will maximise profits only when price elasticities are high and there are economies of scale to be achieved.

Product mix pricing strategies are used by companies that sell multiple products. Such companies use this strategy for pricing their different products, either for a segmented market, complementary products, optional additions, etc. With product line pricing, a company attempts to segment the market by producing a line of goods and matching differences in perceived quality with differences in prices. The other types of product mix pricing strategies are not as relevant to the current study.

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[13] Based on Kotler, 1999, Chapter 16 [224].

Price-adjustment strategies adjust prices for a product to the different circumstances of their customers. Using marketing terminology, these include: discount pricing, psychological pricing, promotional pricing, value pricing, geographical pricing, and international pricing. Psychological pricing was discussed above as Veblen goods, where the price itself has a value and is used to signal quality, where quality is hard to assess. This requires that the segmented prices match the differences in consumers' willingness to pay and demand. Price changes may need to be made in reaction to changes in demand, input prices, or the prices of substitutes. This is somewhat outside the scope of this study.

3.5.3. Promotion (marketing communication) [224]

There are four main forms of promotion that can be used to communicate the benefit of a good to prospective consumers (promotional tools): personal selling/communication, advertising, sales promotion, and public relations. Barrier methods for HIV-prevention involve intensive personal communication, through health care professionals and sales people providing advice, and between women and peer educators. The way in which the products are introduced and promoted to these intermediaries is therefore extremely important. The other three tools fall into non-personal communication.

The aim of these communication forms have parallels with the stages of consumer decision-making, discussed in the diffusion theory section. In marketing they are defined as: awareness of product, knowledge of product characteristics, liking a product, preference over substitutes, conviction of preference, purchase of product. The ordering of these stages may differ depending on the type of product. Search goods (where most product information is obtained prior to purchase) are more likely to follow this sequence, whereas experience goods (where the quality of the goods can be learned through use) are more likely to be purchased before forming an opinion about the product for repurchase [228]. The choice to use a barrier method and which type to use is likely to follow the latter sequence.

The use of sales promotions can assist in stimulating consumers to try a new product and build relationships with retailers. Advertising takes on a number of forms and objectives, varying according to product life stage. New product introduction requires informative advertising. During growth and when there is competition from substitutes, persuasive and comparison advertising is used. For mature products reminder advertising is used to maintain interest in the product.

Micro-economic theory and advertising

As presented earlier, consumer theory states that demand for a product is a function of its own price, the price of competing products, and consumer incomes. Advertising is suggested to influence demand either through a shift in or a change in the shape of the demand curve [229], specifically:

1. Shift in the demand curve: Advertising can entice new consumers into the market (increase the total demand) or can lead to substitution away from competitors' products.
2. Change the shape of the demand curve: advertising can change tastes and preferences. This will affect price elasticities. Branded advertising can lead to lower price elasticities (a smaller demand response to price changes), while generic advertising can lead to higher price elasticities (a larger demand response). High price elasticities increase competition within a market and thus welfare, while low price elasticities reduce competition and welfare.

The net welfare effect of advertising are widely debated ([230, 231] in [232]), [233-237, 232, 238]. Marshall ([230] in [239]) identified advertising effects as either having a 'combative role', with the aim of decreasing competition by increased product differentiation, or a 'constructive role' which increases competition through increased information (increasing welfare). These effects are not mutually exclusive, and could cancel each other out leading to a neutral welfare effect ([240] in [241]).

Another view on the manner in which advertising affects demand, by Becker and Murphy, argues that advertising does not shift the demand curve, rather it is part of the overall preferences of consumers, albeit not necessarily providing positive utility [233]. In this framework, advertising is a complement of the advertised good, and is sold to consumers at potentially negative prices. An example is television advertising, where the programmes are paid for through advertising. Consumers are compensated for watching adverts by being provided with free programmes, in sum generating positive utility. They could also watch pay television, where there are fees but no adverts. The total welfare effect on a consumers is the utility from receiving the advertising (potentially negative) plus and utility from increased consumption of the good (positive or it would not be consumed).

Advertising has been widely used for HIV prevention in South Africa through billboards, TV and radio shows, newspaper and magazine advertisements, concerts, and even mass cell phone text messaging [242, 243]. Government has linked up with private sector advertising companies to design effective mass media campaigns [243]. These all include messages

promoting safer sex, partner reduction and the use of condoms for HIV-prevention in particular.

3.5.4. Distribution channels

"The channel of distribution is "... all those organisations through which a product must pass between its point of production and consumption." ([224] p 895). The standard marketing textbook discussion of distribution channels focuses on private sector distribution channels and the linkages between the manufacturer and the consumer, such as the warehouse, the wholesaler, and the retailer. Functions of the distribution channel are: information gathering and distribution, promotion of the product, contact with prospective buyers, matching the product to the buyers needs, negotiation, physical distribution, financing, and risk taking. All of these are aimed at facilitating transactions. Traditionally, distribution channels were a system of independent firms maximising their own profits. Under the control of a mother company, vertical marketing systems (such as franchises) work together to maximise the system's profits rather than the profit of independent firms. Horizontal marketing systems occur when companies at the same level decide to collaborate. Hybrid marketing systems are a mix, and use different systems to reach different market segments (consumer groups). This is common in large markets. Some of the problems are that the different systems then face competition from each other, and they can be difficult to manage.

Options for distributing HIV barrier methods are broader than the private sector retail outlets[14]. When dealing with public health goods, the health sector is the most likely initial distribution channel. While the final contact in the private retail sector is the sales person, in the health sector it is the health care worker. Where barrier methods are left to be collected in privacy (either for free or purchased in coin-operated machines), no customer service and usage information is available.

Clinic-based distribution can take place through the public or private sectors. Public distribution, clinical or otherwise, tends to provide contraceptives for free or at a nominal charge [244]. Public distribution does not need to be limited to clinics; it can make barrier methods available at a wide range of locations, such as pharmacies, workplaces, libraries, etc. Private clinic distribution tends to have higher prices, yet can provide higher perceived quality, 'friendlier' service and more flexible opening hours. Other private distribution

[14] The initial fitting of the diaphragm is the exception as this must be done in a medical setting. Thereafter the variable input (spermicide or eventually microbicides) can be distributed through private sector channels.

channels include supermarkets, pharmacies, and other retailers, and sell commodities at a profit.

Community-based distribution was developed to reach populations that live far from clinics, mostly rural populations. Community-based distribution uses community outreach workers, and/or peers to provide outreach, as well as information, education and communication (IEC), and distribute contraceptives, usually free or subsidised [245, 246]. Social marketing is often considered as a distribution mechanism, but is broader and as such is covered in more detail in the next section.

3.5.5. Social marketing

Social marketing is the application of private sector tools to stimulate positive behaviour change [247, 248, 89]. The notion of social marketing was first put into words by 1951 by Wiebe who asked "Why can't you sell brotherhood like you sell soap?"[249]. The idea that social change could be initiated using private sector marketing methods has since grown into a discipline of its own. One early definition of social marketing is that "social marketing is the design, implementation, and control of programs calculated to influence the acceptability of social ideas and involving considerations of product planning, pricing, communication, distribution, and marketing research" [250] in [251]. Underlying this definition is the idea of voluntary change, making adopting the desired behaviour more advantageous than not adopting it. Kotler and Zaltman (1971) later formalised the link between social marketing and private sector marketing tools (the marketing mix), more commonly known as the four Ps: product, promotion, place and price, and defined their meanings in the context of social marketing, as follows [247, 251, 248].

Box 3-2 The meanings of the four P's as applied to social marketing

Product: These are the benefits that will be acquired by adopting the desired behaviour change. Behaviour change can also include uptake of the desired product and/or services. 'Products' are designed or packaged to fit the target consumers' tastes and desires to make adoption something that provides tangible benefits to individual consumers.

Price: These are all costs to consumer, be it direct, indirect, tangible and/or intangible to adopt the desired behaviour.

Place: The distribution and response channels through which motivation can be translated into action. For products or services these are the distribution systems and outlets through which they can be accessed.

Promotion: The communication/persuasion strategy to inform consumers of each of the above P's, that is: what the benefits are to that specific group of consumers, how it can be adopted and at what sacrifice/cost. Though mass media/advertising is most commonly associated with social marketing, promotion also includes personal one-on-one selling/promotion, unpaid publicity, and sales promotions.

Underlying each of these activities is consumer/market research and continuous monitoring and evaluation to inform and re-inform the design of the social marketing programme (in each of the dimensions of the four P's). Consumer research aims to understand the market segments. It goes beyond demographic groupings common in public health, to group consumers by their current behavioural characteristics, attitudes and aspirations [247]. Based on this, the programme can be planned to best increase uptake/adoption among the target audience.

3.5.6. Social marketing of public health products

Public health products are "commodities that are used for treatment of diseases of public health importance or for the promotion of health, which can be distributed through the retail level without a 'service' attached to them."[252]. All barrier methods for HIV prevention can be considered public health products, with their public health importance lying in their prevention of HIV, not only for the user but for society as a whole. The positive externalities related to their use mean that although there is still a role for markets, the market equilibrium will be lower than socially desirable[15]. Market intervention is thus expected to improve outcomes [244].

However, public health products also have a number of characteristics that support the use of the market for their distribution [252]. Most benefits accrue directly to the users

themselves (private goods) [252]. Within product categories, they tend to be relatively homogeneous goods, and generally have low barriers to entry and exit for suppliers [252]. Thus one could argue there might be space for both private and public sector provision. As mentioned above, private sector provision may reach just small segments of consumers in some developing countries, because private sector condoms are often too expensive for the majority. For example, in many countries with very low income levels, there just is no private sector market for condoms; the willingness and ability to pay for condoms is too low to support private sector provision. The public sector can distribute condoms affordably for consumers (free), but can have problems with inconsistent supplies. Quality may also be low or perceived as low [253]. Social marketing tackles the space in between private and public distribution systems.

Social marketing organisations use subsidised, usually donor sponsored, products to be able to offer public health products at 'affordable' prices, but not free. The most popular application of social marketing in public health interventions in developing countries are family planning and reproductive health, maternal and child health (including malaria interventions) and HIV/AIDS[254], which tend to include distribution of public health products.

Although HIV barrier methods themselves would be considered as *experience* goods (goods of which quality can be learned through repeat purchases, which tend to have relatively low advertising elasticities because information is primarily obtained through use), demand for barrier methods will be more derived demand: people will tend to purchase them as a means of purchasing pregnancy and/or disease prevention. In that sense, barrier methods then become a *credence* good (a good of which the quality is rarely learned) [255, 256] in [228]. Other examples of credence goods are car seats, anti-wrinkle creams and vitamin supplements. As the quality of credence goods is very difficult for a consumer to assess, they rely on other signals, such as price and advertising, to provide information on whether to use the product and which brand of the product to use. This is how social marketing programmes, by distributing products at a positive price, send out a message that suggests higher quality products.

Advertising by social marketing organisations is usually both generic and brand specific. Generic mass media and IEC campaigns aim to promote the use of condoms in general and thus to increase the size of the whole market, potentially leading to a crowding-in effect for

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[15] See Section 3.2.4 for more discussion of externalities.

different brands. Brand specific advertising is used to differentiate products, often on the basis of packaging and pricing, and aims to increase a brand's market share (potentially leading to a crowding-out effect for other brands). When introducing multiple social marketing brands targeted at different consumer groups, branded advertising can also increase the size of the market within these target groups, rather than causing substitution between existing users of other brands.

3.6. Applications of theory to current study

This chapter has reviewed the basic consumer theory in economics, then moves on the Lancaster's new theory of demand, the theory of diffusion of innovations from sociology, and finally considers the marketing perspective of stimulating uptake of goods.

The concept of marginal rate of substitution plays an important role in this research. The marginal rate of substitution between different barrier method attributes and between different distribution channel attributes will be estimated. The foregoing reminds us that, in the case of 'regular' concave preferences, the marginal rate of substitution will depend on the baseline quantities (levels) of each good (attribute), and will change as these baseline quantities change.

Expected utility theory is important when analysing the choice of whether or not to use any barrier method. Barrier methods for HIV prevention are used to prevent an uncertain event with uncertain consequences. First, it is often not known if the partner is HIV-infected. Second, even if he is, it is not certain that transmission will occur in that sex act. With the introduction of antiretroviral therapy, even the consequences of becoming HIV-infected are uncertain. On the other hand, the immediate negative utility of using a barrier method has much less uncertainty surrounding it. Lancaster's theory of demand, where products are conceptualised as providing a package of characteristics leading to utility, can also incorporate the concept of uncertainty. Lancaster leaves specific characteristics of the products open. The diffusion literature suggests five general dimensions of product attributes that affect the speed of their adoption. The review of the marketing literature shows that it is not only the product attributes that are critical to uptake, but also the perception of the product and the systems through which it is distributed.

This study will contribute to the theory by testing women's consistency with the fundamental axioms of economics and with the applicability of diffusion theory and its five key product dimensions to the introduction of new barrier methods for HIV prevention.

The application of this theory to practically collecting data to estimate utility and demand and its analysis is discussed in the following chapter.

Chapter 4. Discrete choice experiment methods

4.1. Introduction

In Chapter 2, the theory of demand and uptake of new product uptake was reviewed. Here different approaches and methodological issues related to designing, implementing and analysing discrete choice experiments (DCEs) are reviewed. This chapter is based on the following texts: Louviere et al. (2003)[257], Bateman (2002)[258], Ryan (2001)[29], and Mitchell (1989) [259]. It is supplemented by stated preferences (mainly DCE) literature listed in Pubmed either in health economics, policy or services journals or focussing on specific topical areas of interest (women, sexual and reproductive health, risk presentation, low and middle income countries, qualitative methods in DCE). Given the exponential growth in the use of stated preference methods in health in recent years [260], I concentrate on the more recent studies published from 2005 onwards. Ninety-three relevant papers were identified, of which 74 applied DCE or conjoint analysis methods, and the remaining 19 were theoretical or literature reviews containing no new empirical data.

This chapter starts by providing a rationale for focussing on DCEs in my thesis followed by a discussion of the specific steps and methodological issues involved in conducting them.

4.2. Methods for studying product uptake prior to introduction

Methods for studying the demand for goods that are not yet commercially available, such as microbicides and diaphragms for HIV prevention, can be drawn from methods designed to value non-market goods. The development of these methods started in environmental economics, specifically for valuing public goods, such as environmental commodities (such as nature reserves and clean streets). Mitchell and Carson provide a clear overview of the direct and indirect methods that are used to value non-marketed goods (Table 4-1)[259]. The most commonly applied methods are in bold an d are discussed in more detail in the subsequent sections.

Table 4-1 Behavioural-based methods of valuing public goods

	Direct	Indirect
Observed market behaviour (revealed preferences)	Referenda Simulated markets Parallel private markets	Household production **Hedonic pricing** Actions of bureaucrats or politicians
Responses to hypothetical markets (stated preferences)	**Contingent valuation** Allocation game with tax refund* Spend more-same-less survey question*	Contingent ranking Willingness to (do something) Allocation games Priority evaluation techniques **Conjoint analysis** Indifference curve mapping

From Mitchell and Carson Table 3-2 p. 75 [259]; * specific to public goods where tax payer funds are allocated.

Observed market behaviour valuation methods are also referred to as revealed preference methods. They are designed to value existing goods that are not sold, but for which opportunity costs can be observed for its consumption. Hedonic pricing estimates the value of specific (non-market) characteristics of a good or services by variations of how much people are willing to pay for the good or service with its specific characteristics. For example, Levy and Quigley used this method to estimate people's willingness to pay for quality and quantity of health care services using data from the Ghana Living Standards Survey [261]. Another typical example of hedonic pricing is estimating the value of neighbourhood characteristics such as cleaner streets by the difference between house prices in cleaner and less clean areas[262]. Although in principle this is a method with strong validity, in practice the data requirements are very intensive, as sufficient observations are needed to control for all other factors affecting demand for a good or service. Importantly for our application, the good or service needs to exist. When obtaining observational data on preferences is not possible, stated preference methods can be employed. Stated preferences are responses to hypothetical markets (rather than observations based on actual purchasing behaviour) and can be used on a more experimental basis to estimate values for hypothetical products. These methods are discussed in detail below.

4.3. Stated preference techniques

As microbicides and cervical barriers for HIV prevention do not yet exist, and the female condom is not widely known in South Africa, only hypothetical (also known as stated preference) methods can be used. Two methods are commonly used to estimate people's preferences for hypothetical goods: contingent valuation and choice experiments [263]. In contingent valuation the respondent is asked explicitly about their willingness to pay for a

certain good.[16] Advantages of contingent valuation are its relative simplicity, its consistency with welfare economic theory. And it generates data that allow for the direct estimation of inverse demand curves. The main disadvantage is that it does not give us any information about preferences for the specific attributes of the good or service and how uptake may vary with different levels of the attributes. As predicting uptake and determinants thereof is our main interest contingent valuation methods are not discussed further in this thesis[17].

The indirect methods need a step in between to link the responses to their marginal utilities and willingness to pay. There are a number of different indirect methods for eliciting preferences for hypothetical goods. Those involving manipulations of attributes and levels have their roots in Lancaster's theory of demand, and in mathematical psychology through Luce and Tukey (1964) who first designed "conjoint" measurement [266]. Respondents are presented repeatedly with scenarios made up of changing levels of attributes that describe a good or service and are asked to indirectly value them, using a range of possible methods such as rankings, ratings, and paired comparison and DCE. DCEs let people choose between alternatives (sometimes versus the status quo). The advantage of DCE is that respondents are faced with trade-offs between product attribute levels, representing more closely the choices made in everyday life, rendering them more realistic [267], and it is consistent with random utility theory.

Frequently in the literature, 'conjoint analysis' is referred to as an umbrella term capturing different types of conjoint analyses including DCEs and ranking, rating, paired comparison [268]. It must be noted, however, that the most prominent researchers in this area do not consider DCE part of conjoint analysis Louviere 2000 [269] in Ryan 2008 [268] and Amaya-Amaya (2008) [28], thanks to its theoretical underpinnings in random utility theory[270]. This is also the method that allows estimation of the marginal rate of substitution between barrier methods and the valuation of the attributes of different distribution channels.

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[16] Alternatively respondents can be asked to accept it being taken away in the case of willingness to accept (WTA). As microbicides do not exist, it would be impossible for people to estimate how much they would have to be paid to give it up, therefore WTA will not be discussed any further.

[17] Uptake predictions have been made using CV and conjoint rating for HIV vaccines, microbicides, and STI vaccines [264, 123, 265]. However, CV does not allow for understanding the specific attributes of the product or service that influence rates of uptake.

4.4. *Introduction to discrete choice experiments*[18]

DCE[19] is rooted in both Lancaster's theory of demand (described in Chapter 3 and Random Utility Theory, and provides values that can be interpreted as marginal benefits. Respondents are presented with two or more choice sets (scenarios) and are asked to select their preferred scenario. Each scenario represents different levels of a number of product/service attributes. The aim of DCEs is to estimate the probability of an individual choosing to consume a specific service or set of attributes, *x*, given their observable individual characteristics (socio-economic status) *s* and the choice alternatives (choice set) available to them *A*, of which *x* is one of the alternatives: $P(x \mid s, A) \quad \forall x \in A$[20]. In doing so individuals are assumed to be maximising their utility. Stated the other way around, DCE aims to estimate the importance of the observable determinants of utility (the attributes of a good or service and individuals' characteristics) in making consumption choices. This is derived from their ranking of the alternatives in the choice experiments. They are assumed to base their choices on full information, using all the information in making their decisions, and to be compensatory in their choices, that is be willing to trade off between the alternatives, depending on their attributes and levels.

Utility, *U*, in the random utility theory framework can be considered to have a systematic component, *V*, and a random component, ε, representing unobserved differences in tastes. The systematic utility *V* derived from the consumption of attributes is based on the individual's observable characteristics (socio-demographic characteristics) *s* and the consumption choice alternatives *A* available to them: $U_{iq} = V_{iq} + \varepsilon_{iq}$.

V is the sum of individual *q*'s objective utilities β of the service/benefit set of attributes of alternative *i* with attributes *k* and the subjective utilities *s* of consuming *ik*: $V_{iq} = \sum_{ik=1}^{K} \beta_{ik} s_{ikq}$.

Discrete choice models, originally developed by Daniel McFadden, can be used to estimate utility values for the different attributes and their levels [271]. These are a family of

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[18] This section is based on Louviere (2000) and Bateman (2002).

[19] This type of preference elicitation has been captured by numerous names: conjoint analysis, choice modelling, discrete choice modelling, stated preference discrete choice modelling, etc.

[20] The choice set represents all alternative choices that could be made at that given time. These alternatives are provided with stated preferences. DCM are also used with revealed preference data, in which case the consumers choice set used in the decision making process is not observed and must be modelled (Swait 2001, Ben-Akiva 1995).

econometric models developed to analyse choice data and can accommodate both revealed and stated preference data. Discrete choice models assume that: choices are mutually exclusive and the choice that is made maximises utility, given the alternatives available at that time. The ratio of two attribute coefficients (βs) is the marginal rate of substitution between the two attributes. When one of these is expressed in monetary terms, it provides the marginal willingness to pay for a change in the other attribute. Other outputs that can be estimated from discrete choice experiments are: elasticities and cross-elasticities, willingness to pay for a specific product (given the levels of its attributes), identification of market segments and their group-specific willingness to pay, projection of market shares between substitute products, and estimates of aggregate welfare changes.

Box 4-1 shows the key stages in conducting a DCE study as defined by the major authors in conjoint analysis and DCE (based on Green, 1978, Ryan 2001, Bateman 2002, Louviere 2003, Henscher 2005 [258, 272, 257, 29, 273]). Each of these basic texts includes small variations to these steps, which are incorporated below.

Box 4-1 Steps in conducting a DCE

1. Define study objectives
2. Conduct supporting qualitative study
3. Identify/select attributes
   - Assign levels to the attributes
4. Develop and pilot data collection instrument
   - Select stimulus presentation: verbal description, pictorial, etc.
   - Reduce number of scenarios to manageable level
   - Choose experimental design: full versus fractional factorial design and construct choice sets
5. Define sample characteristics
6. Choose survey procedure and perform data collection
   - Elicit preferences
7. Test for reliability, validity consistency and other potential biases
8. Conduct model estimation
   - Select a model of preferences [272]
   - Analyse data using regression technique
8. Conduct analysis to answer policy questions

There seems to be one important step omitted: testing for violations of the fundamental axioms of economics and other biases. Below I use these stages to provide a framework for presenting the methodological issues in discrete choice experiments. The sections are based on the texts by the main authors mentioned above [258, 272, 257, 29, 273], only references from alternative sources are mentioned.

4.5. Define study objectives

DCEs can be used to address a wide range of questions. Health care and environmental applications have obtained aggregate values for proposed interventions to guide resource allocation between different services and to estimate the uptake of new services [274]. Marketing applications have aimed: to assess how consumers value different potential attributes of new products/services to feed into the design process, to forecast demand for new products or different promotional/advertising messages and their impact on product uptake, to identify market segments and potential for product differentiation (optimal multi-product production strategies), and to estimate market shares of substitute products [272]. Similar questions have been addressed in the transportation, agricultural and environmental economics literature [258]. In health economics, most of the applications aim to value the impact of interventions on social welfare. In more recent years there has been a move to use stated preference methods to inform intervention development and identify factors that would increase uptake [275-287, 264, 288]. However, the use of DCE to predict uptake of services/ products is still rare, since 2005 only five DCE studies were found in the health economics literature, [281, 283, 285, 289, 290] with actual predictions of the percentages of the target group likely to take the product up.

The objectives of the study will determine the subsequent steps (presented below).

4.6. Conduct supporting qualitative research to predict uptake

Consumers may make their consumption decisions based on very different attributes than researchers can foresee. The consumer decision process was described by McFadden to illustrate that we can only observe/capture some of the variables that influence consumption choices. Actual values, perceptions, preferences, and market behaviour cannot be directly measured [271]. Several authors stress that the consumer decision-making process should be explored in depth through qualitative research to inform the design of the stated preference methods (i.e. the attributes and levels and their representation) [291, 292]. Qualitative research can further provide insights into "personal characteristics that affect choice, sources of utility differences, choice set characteristics including size and whether different decision rules are used and if so why and when. Other issues that may be of interest are attitudes that affect demand, substitute and complementary products, etc." ([257] p258).

Although the literature on stated preferences refers to qualitative research generally, in practice it tends to mean interview-based qualitative methods, allowing the respondent to

give his/her own interpretation of the issues [293]. This can be either on an individual basis or in a group discussion. These two approaches are discussed below, followed by a section on qualitative analysis methods. These sections are largely based on Green and Browne (2006) and Pope and Mays (2006) [294, 295].

4.6.1. Individual interviews

Semi-structured and in-depth interviews are widely used in health research both as an end themselves and as a means to developing survey instruments [296, 297]. Semi-structured interviews employ a topic guide to discuss a predetermined range of topics but allow for divergence when interesting issues are raised by the interviewee. In-depth interviews aim to cover fewer topi cs m ore int ensively, with follow-on questions developing from the interview itself rather than determined before hand [296]. They further have many methodological aspects in common (which are not *per se* exclusive to individual interviews). It is often helpful to start with fairly general and easy to answer questions. This helps to establish the type of language to use and to establish a rapport with the interviewee. Questions are open-ended to encourage the interviewee to expand on the questions; non judgemental and neutral to encourage the interviewee to provide truthful responses and to ensure the interviewer is not imposing their own opinions on the interview. Finally questions need to be clear and concrete to help the interviewee provide the desired information.

In addition to being a method for eliciting a broad or detailed understanding of the topic area, individual interviews can be used to pre-pilot survey tools. For the latter, the research question is: is the interviewee interpreting the questions in the way they were intended and able to answer in a meaningful way and how best to improve the questions in the survey instrument. To such an end the analysis is often far simpler than traditionally undertaken analysis of qualitative interviews.

4.6.2. Focus group discussions

The focus group discussion moves from a single interviewer-interviewee relationship, to a setting where group dynamics are of key interest. Though a moderator is present to guide the discussion, but the participants take a very active role in the research [297]. The interactions, discussions and debates between participants provide an additional layer of information that could otherwise not be obtained [297, 298]. It is particularly appropriate for identifying cultural/ group norms and attitudes [298]. A group setting can allow for debate

and disagreement thus collecting a wider range of opinions than otherwise achievable through individual interviews.

Focus group discussions usually have between 8 and 12 participants [297] and last between 1 and 2 hours [298]. It is important to consider how participants are selected and grouped together, as this can either facilitate or stifle free lively discussions. Similar to the semi-structured interview, a topic guide is used. In focus groups an initial ice breaker is needed to start everyone off talking, and similar to semi-structured interviews it is recommended to start with general questions and move on the more specific questions, with not more than five main questions [297]. These can be supplemented by objects or other relevant materials to focus the discussion [298]. The discussion can be brought to a close with a summary of the main points.

Both focus groups and individual interview are best documented using recordings that are subsequently transcribed (and translated if necessary) in full [297, 298].

4.6.3. Analysis of qualitative interview data

In contrast to quantitative data analysis that starts once all the data is collected, the processing of qualitative data starts during collection and tends to be an iterative process, where the earlier interviews feed into subsequent interviews [299].

Two rigorous approaches to analysing qualitative data in health research are commonly used: Grounded theory and Framework analysis [300, 301]. Grounded theory approaches the data with the aim of discovering theory and developing hypotheses, then tests the hypotheses in an iterative manner until a saturation of ideas is achieved. This process can be very time-consuming. Framework analysis is a structured approach that aims to meet specific policy research goals. This entails five steps: familiarisation with the data; identification of themes that are both obtained from the data and also predetermined; coding of the text/data; organising and summarising the data in a table; and interpretation.

Slightly less intensive methods of analysis are thematic analysis and content analysis. Thematic analysis is a commonly-used method, aimed at identifying themes in the data [302]. It entails grouping the data by themes and reviewing the range of concepts across transcripts by theme. Content analysis proceeds to count the frequencies of the appearance of the themes.

When using the qualitative interviews for the sole purpose of designing a survey, even simpler techniques can be applied, such as compiling a list containing the range of topics raised, however this does miss the richness of such data.

4.7. Identify attributes and levels

The method for identifying attributes depends on the study objectives and availability of information. Information can be obtained from such varied sources as: literature reviews, focus group discussions, individual interviews, direct questioning, or it is determined from pre-defined policy questions or randomised controlled trial outcomes [258, 303].

Of the 74 conjoint analysis and DCE applications in health economics since 2005 [304, 275, 305-307, 276, 308-310, 292, 311, 277, 312, 278, 313-322, 279, 323-326, 123, 327, 328, 280, 329][281, 330, 331, 282, 332, 283, 333-335, 285, 286, 336-340, 289, 341-358, 290, 359-362, 265], 16% (12) did not mention how the attributes were identified [312-317, 325, 282, 358, 290, 360, 361]. Of the 63 studies that did, the most popular method was literature review, included in 34 studies [304, 307, 276, 308, 310, 277, 278, 318, 363, 321-323, 327, 280, 329, 332, 283, 333, 334, 285, 286, 336-338, 340, 341, 344, 345, 347, 353, 355, 357, 362, 265]. FGDs, IDIs and expert opinion were used by 17, 18 and 17 studies, respectively (Table 4-2) .

Table 4-2 Frequencies of methods used for identifying attributes

	Literature review	FGD	IDI	Expert opinion	Policy relevance	References
Literature review	**12**	3	4	4	4	[304, 307, 276, 308, 310, 277, 278, 318, 363, 321-323, 327, 280, 329, 332, 283, 333, 334, 285, 286, 336-338, 340, 341, 344, 345, 347, 353, 355, 357, 362, 265]
FGD	3	**9**	1	0	0	[275, 307, 321-324, 326, 123, 328, 330, 331, 333, 337, 289, 352, 354]
IDI	4	1	**7**	2	0	[292, 309, 320, 335, 343, 356, 359, 318, 279, 334, 338, 339, 354, 265, 277, 347, 357, 322]
Expert opinion	4	0	2	**4**	0	[304, 306, 308, 277, 319, 322, 279, 281, 333, 337, 339, 346-348, 353, 355, 357]
Policy relevance	4	0	0	0	**5**	[305, 276, 308, 278, 340, 342, 349-351, 362]
Used >2 methods	7	3	4	7	1	[308, 277, 333, 337, 347, 357, 322]
Total applications	**34**	**16**	**18**	**17**	**10**	

The diagonal bolded numbers indicate studies that only use a single method; not-bolded are the numbers of studies that used a combination of two methods or more.

A major challenge is to move from the qualitative interviews, where a wide range of attributes tend to be suggested, to a concise and usable set of attributes and levels. Only 17 studies provided detail on how they subsequently moved from the data collected in the preliminary stages to the attributes included in the DCE [318, 277, 347, 275, 324, 123, 289, 354, 306, 349, 292,

[320, 335, 279, 352, 356], although 20 studies did mention that they pre-tested the questionnaire as part of the DCE development process [323, 337, 332, 283, 285, 278, 319, 338, 265, 326, 328, 325, 281, 346, 339, 318, 279, 352, 292, 356]. Most (15) of the studies that did describe their analytical procedures included the collection of qualitative data from either focus group discussions or in-depth interviews. These are presented in Table 4-3.

Table 4-3 Approaches for moving from FGD and IDI data to attributes and levels

	FGD	IDI	Both	# studies	References
Theoretical frameworks					
Thematic analysis	1	1		2	[318, 123]
Content analysis	2	2		4	[309, 324, 335, 289]
Framework		1		1	[320]
Constant comparative (grounded theory)		2		2	[309, 292]
Ad hoc methods					
Ranking exercise		1	1	2	[277, 354]
List all attributes mentioned		2		3	[279, 356]
Study team consensus	2	1		3	[275, 352]
realistic ranges for levels	1	1		2	[347, 352]

FGD: Focus group discussions; IDI: In-depth interviews
Note: 5 studies used multiple approaches; therefore the number of approaches is greater than the number of studies.

A number of different theoretically-based approaches have been applied to analysing the qualitative data: content, thematic analysis, constant comparative analysis, framework analysis. Equally common were the less theoretically rooted approaches, including attribute rankings, collating a list of attributes mentioned to be further distilled down in a next iteration, study team consensus and realistic ranges (for levels only). These were often done iteratively and in combination [292, 352, 320, 364].

However, despite acknowledgement of the importance of the qualitative work in designing the questionnaire and identifying appropriate attributes and levels for DCEs and the mention of analysis methods, few studies have documented the qualitative process in sufficient detail to allow the rigour of the methods to be assessed or provide lessons for

researchers seeking guidance on how best to move from the qualitative data to a limited number of concrete attributes[21].

Coast et al. (2007) provides the most detailed account of how attributes and levels can be identified using qualitative methods based on a case study about access to dermatology services [292]. Three iterations of semi-structured interviews were undertaken with dermatology patients. The first round was exploratory to find out the aspects of dermatology services that were important to people. Based on four interviews constant comparative analysis was applied to identify key themes, comparing newly emerging themes with themes from previous interviews until no new themes arise (saturation). This also provided the basis to develop a coding schedule for further interviews. In the second iteration, 11 more interviews continued to explore general preferences but begun to confirm issues that were raised in the first iteration. Some attributes (waiting times and provider expertise) appearing most important in the first iteration were confirmed in the second iteration interviews which allowed for a preliminary search for appropriate levels from other sources. Associated trial results and current NHS practice were examined for realistic values for waiting times; medical training was considered as a way of presenting expertise. These first 15 interviews were coded and analysed using a thematic approach and content analysis. This generated the conceptual attributes to be included and a range of possible descriptors. In the last four interviews, participants were asked their understandings of the different descriptors and the one they felt best described the concept. The most prominent definitions were accepted and subsequently used in the DCE.

This study also raised an important methodological issue of the tension between the usual aim of using qualitative research methods to gain a deep understanding versus the 'reductive' aim of trying to summarise key dimensions of services into a concise list of attributes and levels.

A more practical approach was taken by de Bekker-Grob et al. [277] in a study of osteoporosis treatment. In their two-step approach, the literature was reviewed for all potentially relevant attributes and levels of osteoporosis drug treatment, they then used individual interviews with medical experts and the target population to obtain rankings of the importance of attributes of osteoporosis treatment.

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[21] In the contingent valuation literature this is equally rare: Smith (2003) reviewed the CV literature to assess the methods used to construct the CV scenario and found a similar lack of transparency and methodological rigour [365]. Borghi (2007) has set a precedent in the CV literature explicitly detailing the process of developing the CV market using focus groups [291].

This section has reviewed the recent literature on using qualitative methods to develop attributes and levels for DCEs, the next section looks at broader issue of DCE design.

4.8. Develop and pilot data collection instrument

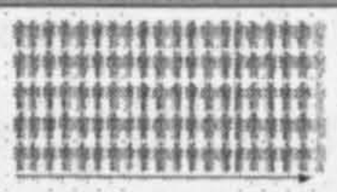
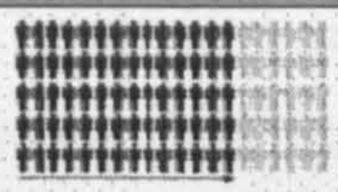
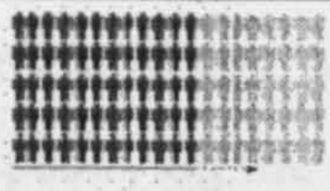
Once the different key dimensions of preference are identified from the qualitative research, the next step is to pull this together into an instrument that is feasible and comprehensible to respondents, and will generate data which can be used to estimate preferences. The steps to developing such an instrument are described below.

4.8.1. Select stimulus presentation

Attention also needs to be paid to how best to present the scenarios to improve realism and avoid responded fatigue and/or overload. There are two issues related to the presentation of scenarios. The first relates to the size of each scenario/choice (number of alternatives, attributes and levels) and the second relates to the size of the experiment (number of scenarios presented).

Stimuli presentation

In the previous chapter, the issue of people valuing negative risks differently from positive risk (prospect theory) was discussed. The implication of this theory is that the presentation of a risk attribute will affect the value that is place on it, i.e. whether the probability is presented as a loss or a gain. Concerns about such framing effects related to the presentation of the risk attribute in DCEs have been raised by a number of authors [327, 366-368]. In terms of communicating risk in recent studies, a range of presentation styles have been used ranging from numerical representations in terms of percentage risk reductions [321 , 353] or in numbers of cases detected or missed (e.g. 55 out of 100) [327] to pictorial representations using coloured 'humanoids' to represent changes in risks such as shown in Figure 4-1 [317, 369].

MEDICINE FEATURE	MEDICINE A	MEDICINE B
Chance that the virus level will be undetectable after one year	 95 out of 100 (95%)	 70 out of 100 (70%)
Chance that the medicine still works well after 5 years and prevents or reverses liver damage	 60 to 80 out of 100 (60% to 80%)	 100 out of 100 (100%)
Chance of a broken bone after 5 years due to a bone-damage side effect	 10 out of 100 (10%)	No Chance
Need for regular blood tests more often	4 times a year	12 times a year
Personal cost to you each month	€100	€50
Which medicine would you choose if these were the only medicines available?	☐	☐

From Johnson 2009[369])

Figure 4-1 Pictorial presentation of the uncertainty of benefits and risks of hepatitis B vaccines

Edwards reviewed the literature on how best to communicate health risks and concludes that the framing effect should be countered by presenting risk impacts both in terms of gains and losses and that a visual presentation can improve risk communication. Recent work on this has confirmed the significance of the framing effect on the valuation of risks. Howard tested for framing effects in DCE related to presenting the same health outcome in terms of a gain or a loss and confirmed that it affected decision making, and thus the estimated utility values. Though there does appear to be evidence on the presence of framing effects in presenting risk, the range of representations used suggests there is no conclusive evidence on the best way to communicate risk in DCEs.

The debate around the usefulness of pictorial representations and/ or actual physical aids is not limited to the presentation of risk. Dahan noted that the use of visual aids may, more generally, improve external predictive validity by increasing the realism of the stimuli [370]. Jaeger compared presenting apple packages on photo cards with prototype (real) presentation and was not able to find that stimuli presentation affected choice results [371].

Five studies applied DCE in low and middle income countries [276, 324, 283, 335, 289] of which four studies represented their scenarios pictorially. Though not stated explicitly, this high rate suggests this may be related to the lower literacy rates in these settings.

Scenario presentation

In addition to the alternatives with attributes and levels, a no-purchase option can be helpful in making the choice realistic, however there are two specific caveats to this option. The first is that it is an easy option when the other choices are difficult to make [367]. The second is that respondents may have different perceptions of the opt-out options' attribute levels. This can be overcome by specifying the status quo or opt-out scenario, or by eliciting this from the respondent.

It is recommended that the number of attributes be kept relatively small, i.e. between four and six attributes per choice, to avoid information overload which can lead to less valid responses [372]. If WTP values are to be elicited then price needs to be one of the attributes. It is important that the levels are realistic and practically achievable ([258] p 259). For hypothetical goods the relevant price levels can be obtained through pilot contingent valuation studies, the literature, or focus group discussions.

Pearmain remains the most cited reference on the appropriate number of choice sets to present and suggests that fatigue sets in between 9 and 16 choice sets [373]. In recent DCE applications in health, the average number of scenarios was 11, ranging from 4 to 28. [319, 321-326, 328, 280, 329, 281, 331, 332, 334, 335, 285, 286, 336, 338-340, 289, 341, 344, 346, 347, 374, 375, 290] Two studies actually test for fatigue effects. Hensher tested for fatigue effects and found no evidence of this when presenting up to 32 choice sets [376]. Coast compared estimates in a 8 or 16 choice sets questionnaire and found not significant differences [310]. Henscher actually found when the choice sets were too few (4 or less) intra-respondent variability was insufficient to model individual choices [376].

4.8.2. Choose experimental design, construct choice sets, reduce number of scenarios to manageable level

Not only does the tool need to be comprehensible for participants, but there are also a number of properties that are desirable for estimation, and will influence the sophistication of the models that can be estimated with the data. The experimental design aims to get the most information from participants using the least amount of questions.

The greatest amount of information is obtained from a full factorial design. Such a design presents people with all possible permutations. This quickly gets unmanageable. For example, if there are four attributes with three levels each, the experiment would contain 3^4=81 profiles. However, it is unusual to value every interaction. Studies have shown that two-way interactions tend to account for around 95% of variance ([257], p 94). For this

reason, fractional factorial designs select a combination of profiles that allow for all main effects and selected interactions to be estimated, and thus greatly reduce the number of profiles (and respondents) needed. This helps to reduce the number of profiles (and thus choice sets) needed, but the most efficient choice sets still need to be constructed from the attributes and levels. However, even with a fractional factorial design, if many attributes and levels are chosen, the design can still lead to designs that are too large to be manageable for a single person. The solution to this is to break the design into individual size blocks (groups of choice sets from the main design).

Huber and Zwerina identified four key aspects of efficient design: orthogonality, level balance, utility balance, and minimum overlap [377]. An orthogonal design is a design without any correlation between the attributes, which allows for estimation of preferences for each attribute. Level balance means that each level appears an equal number of times. If this is lacking, the frequently occurring level will be overemphasised, leading to an upward bias on its level of significance ([378, 379] in [273], p143). Utility balance aims to generate choice sets that are difficult to choose between, thereby forcing the participant to make close choices. This allows for more precise parameter estimates [380]. Minimal overlap means having as few as possible attributes with the same level across the alternatives. The more overlap there is in a choice set, the less information is obtained. If all alternatives have the same level, no information on that attribute can be derived from that choice set.

There are a number of computer programmes that can be used to generate orthogonal designs, such as SPSS and SPEED, or they can be based on published optimal designs such as those from Burgess and Street [381]. From these design profiles choice sets need to be created. When using SAS, the full choice set is generated [382].

In practice, the final design of the choice experiment is a trade off between the realism of scenarios and technical optimality of experimental design.

4.9. Define survey sample characteristics[22]

The approach to sampling DCE study participants is important to enable generalisation from the research. Simple random samples and exogenously stratified random samples are commonly used. Random sampling should normally be done through a household survey, with repeat visits if needed. More convenient than a household sample is to recruit a

[22] This section is based on sections 6.7 and 6.8 in [273].

random sample from a central location, or a household survey where households that are absent are replaced by a predetermined formula, such as the third household on the left.

Sample size calculations are made based upon the probability of the different responses and the minimum required level of certainty (10% usually). However, this assumes knowledge of preferences and choice probablilities prior to the study in which we are trying to estimate just these. This is a problem with sample size calculations of any scientific study, and in particular when the product category does not exist.

Because of this, often choice studies have ignored the theory of sample size calculations and have chosen sizes on more practical grounds, such as budgets and use an estimate of sample size needed to estimate choice models. Henscher states this should be at least 50 per alternative [273] if not attempting to estimate any covariates. A method for achieving this when it is not possible to make a priori guesses about frequencies of choice is to start with an initial quota, which checks the chosen alternative as the data collection proceeds and continues increasing the sample size until the minimum sample per alternative is achieved.

In these consideration about sample size, we are looking for the required number of choice responses, rather than the number of people. In general, DCEs use one respondent to evaluate more than one choice set. Although this does not conform to the assumption that each of the choice responses are independent, it is important to emphasise to the respondent that each choice must be answered without taking previous answers into account. However, the lack of independence associated with using a single respondent to make multiple choices creates wider confidence intervals and lower statistical efficiency. This needs to be corrected by using econometric models for panel data, such as random and fixed effects models. This is discussed in more detail in Section 4.11. below.

In the recent literature, sample sizes have ranged from 30 to 2684 respondents with an average of 486 respondents, who have been presented with between 5 and 20 choices each with an average of 12 choice sets. The average sample size was 5776 observations per study. In the

4.10. Choose survey procedure and perform data collection

DCE surveys can be conducted using mail, the web, telephone, and face-to-face interviews [257]. Interviews can be pencil and paper or computer-based; each has their respective advantages and disadvantages. Mail-based can be cheap on labour, but can have large

losses due to non-response. Web-based can be private, potentially allowing respondents to be more honest in response to personal questions. Sethuraman found that valuations of attributes depicted with visual aids were higher when administered through a web-based questionnaire than a paper-based mail questionnaire [383].Telephone surveys can be less expensive than face-to-face interviews, and more personal than web-based or mail questionnaires. Face-to-face interviews are the most personal but can be highly labour-intensive and thus expensive. The advantages of computer-generated questionnaires are that they can be adaptive and reduce errors related to skipping questions and errors in data entry. However, even very small handheld computers can be quite expensive, and add an element of danger for interviewers, especially in areas with less than ideal security, such as South African townships. Paper and pencil is simple and safe, but is data-entry intensive and subject to human error when completing the questionnaire and entering the data.

4.11. Assess reliability, validity, consistency and other potential problems.

Questionnaire design is riddled with issues about how to verify whether 'true' information is being collected. There is much literature on the ideal psychometric properties of questionnaires. Usually problems in using questionnaire-based data relate to validity and reliability. Reliability relates to how robust a reply is over time and whether the same response will be collected if re-asked. Validity refers to whether or not the instrument measures what it attempts to measure and is true and accurate (unbiased) [384]. The different dimensions of validity are presented in Box 4-2. However, it must be noted that different authors refer to these concepts differently, and do not always include all the dimensions in their descriptions of validity.

Box 4-2 Overlapping dimensions of validity

Face validity: Is the presentation of the good/ scenario understandable and plausible?

Content validity: Does it measure *all aspects* of what we want it to measure? Is the presentation of the good/ scenario understandable and plausible?

Criterion validity: "The correlation of a scale with some other measure of the trait under study; ideally, a 'gold standard'" [385].

Construct validity or concurrent validity or convergent validity: Is the measure related to other indicators of the same thing? [386, 387] For example, do the willingness to pay values correspond with real prices? (Mitchell and Carson,1989) [259]) Does the measure converge or is it consistent with other measures measuring the same thing (construct)? [29]. This is a more practical version of criterion validity and relaxes the assumption that there is a gold standard 'true' measurement available [384].

Predictive validity (external validity): How well the responses on 'intent to buy' predict actual purchasing behaviour outside of the studied population. External validity can be tested in a number of ways. Natter used three tests: 1. The correlation between model forecasts and actual observation (market shares) focusing on price and brand variations, which validates quality of price effect estimates, 2. The absolute deviation between average forecasted and observed market shares per market segment, which validates quality of level estimates per segment. 3. The mean square error between the predicted and observed market shares validating external forecasting performance [388].

Internal validity: How well does the model predict responses within the study population? [389] A common test used is the 'hit rate'. The hit rate is the percentage of accurately predicted purchase and accurately predicted not-purchase choices for responses not included in the estimation procedure. This is often done on choices specifically included in the experiment for this purpose, called 'hold-out' questions.

Theoretical validity: Is the measure consistent with the *a priori* theoretical expectations before conducting the survey? Ryan calls this *internal validity* [270]. This can be tested comparing the expected sign of the variable with the sign of the estimated coefficient.

Some of the more general issues are related to internal and external validity [389]. First, there are general concepts based on intuition: face, content, and construct validity.

A second dimension of validity is associated with measurable outcomes, and examines the correlation between a measure and a related concept. This dimension includes criterion validity, concurrent and convergent validity. Predictive validity describes how the outcome can predict the responses to questions that were not included in the estimation. This can be

both internal and external. Internal validity relates to how well the responses hold within the surveyed sample (i.e. predict responses within the sampled population), and external validity relates to how generalisable the results are to outside the sample [389].

4.11.1. Biases and other effects

As well as potential biases caused by the format of the question, there are a few additional problems related to stated preference surveys that are not directly linked to the question format. Hypothetical bias (also known as scenario miss-specification [390]) arises when the scenario presented is unrealistic or is not fully understood by the respondents, leading to intent (responses to questions) diverging from actual behaviour. If the sequence in which questions are posed influence the response, then we have a question-order bias. Both Scott and Day found that the order in which the attributes are presented in the choices influenced their coefficient estimates [391, 392]. In contrast, Ryan did not find an ordering effect in her conjoint rating experiment [270].

Several biases are thought to be lower in indirect elicitation methods than in direct elicitation methods such as contingent valuation, but may still occur. These are:

Strategic bias, when respondents purposely over- or under-estimates their values in order to influence the outcome of the study and thus the price and/or the provision of the good. Compliance bias is when people misrepresent their true values to please the interviewer or the sponsor of the study. Implied value cues, including starting point bias and range bias, implicitly suggest a 'correct' answer to the respondent [393].

Status quo bias or endowment effect arises when the values placed on goods already owned or experienced are higher than those not in one's possession or those that have not been experienced [394-396]. Moreover, attributes that are unfamiliar or which the respondents have not experienced may not be taken into account in the choice process [270]. If this is the case, there are implications for the sampling of participants in such experiments, especially in health care where this may lead to different valuations of service between patients and non-patients.

Structural reliability – whether or not the number of attribute levels on responses has an effect – was explored by Ratcliffe [397]. She tested this by comparing the responses of questionnaires differing only in attribute levels. Responses were compared for attribute dominance and differences in model parameters. A third test was undertaken by modelling

utility with slope dummies to detect differences in the slopes of the two questionnaire responses. Evidence on this was mixed: the attributes with differences in levels received higher importance with more levels, however the other attributes were not affected, nor was the portion of responses with dominant attributes.

Another set of problems can arise if the preferences estimated from the responses are not consistent with economic theory in terms of adhering to monotonicity, transitivity, stability, and completeness (for definitions of these concepts please see Section 3.2.).

Violations of monotonicity (i.e. more is better) is observed through lexicographic preferences, where there is no substitution between any attribute, i.e. respondents are not willing to trade at all, and dominant preferences, where respondents choose a specific attribute level every time it is offered [398]. Dominant and lexicographic preferences are frequently explored in conjoint analyses with a health services focus, but rarely mentioned in studies in other disciplines such as marketing, transport economics and agricultural economics. Within the health valuation literature lexicographic preferences have been reported in a few studies [399-401] in [402]. Studies reported wide variations in the share of respondents displaying dominant preferences, ranging from 0% to 48% [394, 403, 404, 303, 399]. This lack of trading can be due to respondents using 'fast and frugal' heuristics; that is simplifying the task to a manageable level by evaluating the choice-based scenarios purely on a single attribute rather than on the full scenario presented [405]. Thus one of the basic key assumptions is violated. Dominance can also be caused by a hierarchical choice process, which is discussed in more detail in the section on model estimation above. Another explanation could be that the range of attribute levels included in the scenarios is not wide enough to reach the levels at which the respondent is willing to trade (framing effects) [405]. This was shown to be a major contributor to non-trading responses [406]. One study shows the contrary can also be the case: Scott suggests that when variation in levels is too great, increases in other attributes are not large enough to compensate for the larger drop in one attribute level, leading it to seem like a dominant attribute[23][402]. This shows the importance of getting attributes and levels right, and exploring willingness to trade between these attributes and levels in face-to-face interviews during questionnaire development and the pilot.

Dominance can be tested by including a profile in which one of the choices is unambiguously better than the other. This can range from a choice set where the levels are

[23] Although this may also be seen as the ranges of the other attribute levels being too small.

the same for at least one attribute, and the other attribute levels are equal or better for one of the options (across-pair monotonicity), to a choice set where all attribute levels are better than those in the other option (the dominant pair test). When there is no substitution between attributes and levels, marginal rates of substitution cannot be estimated. Most empirical applications in health care have included a dominant pair test in their survey. Studies report violations of monotonicity between 1% and 27% [407, 394, 398, 408, 404, 303, 409, 410].

Transitivity can be assessed by looking at the utility rankings of the attributes: if a>b>c then a>c. If this is shown in the estimates of the preferences, then transitivity holds. Explicit exploration of transitivity is rare [411-414]. Two studies (van der Pol 2001 and McIntosh 2006) have tested transitivity and found it was violated between 6% and 11% [412, 414].

Stability and completeness: I f people develop their valuations while undertaking DCE surveys their preferences display instability and violate the axiom of completeness [415-417], one of the fundamental building blocks of neoclassical economics. Stated preference surveys force completeness of preferences if they do not include a 'don't know' option, and thus cannot test for consistency in preferences in terms of completeness [418]. Stability of preferences can be tested by repeating one or more choice sets at the beginning and end of the survey [418]. Ryan and San Miguel set out to test violations of this axiom and could not find evidence that preferences were being formed during the process of completing the questionnaire (incompleteness of preferences) [415]. Jaeger argues that training exercises may help respondents develop their preferences for more complex and less familiar products [371].

Finally McFadden adds two key issues relating to the validity of choice model estimates: 1. Omitted variables in the choice experiment and the estimated model; 2.Selection of a choice model [271]. These will be further discussed in the following modelling section.

4.12. Conduct model estimation

Traditionally, discrete choice experiments have been analysed using the multinomial logit (MNL) model. This model is fairly simple to estimate and interpret and has been the most widely applied. However, its validity is based on the relatively restrictive assumption of independence of irrelevant attributes (IIA).

IIA means that choices are not affected by the possible alternatives: the choice between a car and a bus should not depend on the availability of a train; if the choice does depend on

the availability of a train, then IIA is violated. The implication of this is that the random terms in the utility function must be independent between alternatives and have identical distributions.

The nested logit model (NL) and the random parameters logit (RPL) model relax the assumption of IIA. Here follows a description of the MNL model, its estimation and outputs and justifies the application of the NL and RPL models.

4.12.1. The multinomial logit (MNL) model

Section 4.4. presents the basic MNL model. It presents an individual's utility[24] for a choice alternative i as made up of a systematic component V and a random component ε:

$$U_i = V_i + \varepsilon_i \qquad \textit{Eq. 4-1}$$

If there is a probability of each alternative being chosen and IIA (see Chapter 3) holds, then we can estimate:

$$P_i = \frac{\exp V_i}{\sum_{j=1}^{j} \exp V_j} \qquad \textit{Eq. 4-2}$$

and

$$V_{jq} = \sum_{k=1}^{k} \beta_{jk} X_{jkq} \qquad \textit{Eq. 4-3}$$

where P_i is the probability of choosing the ith alternative, and where X are the attributes as perceived by individual q, and j is the alternative with k attributes, V_{jq} is utility of an alternative j to individual q with specific attributes (the socio demographic characteristics s, above) and levels X. Sometimes these socio-demographic characteristics are presented more explicitly, to show V as a function of the product characteristics, X, and the individual's s. The impact of s on the choice probability is modelled in generic experiments, like this one, by interacting s with X.

This model, estimated by the maximum likelihood estimator, can then provide estimates of the utility parameters, βs, for the choice alternatives j using the equation above. The βs of those attributes can be added as in the equation above to obtain the utility.

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[24] It is important to remember that these utilities are relative measures, and therefore relative to the utilities of the other alternatives in the choice set. When using effects coding, the mean utility is set to 0, and the parameter estimates of categorical variables are presented as deviations from their means (0).

The output also provides a t-ratio for each utility parameter. When significant this can be interpreted to influence an individual's choice, i.e. that the attribute is important to the decision maker. Goodness of fit for such models is evaluated using the likelihood-ratio index (also called the ρ^2 statistic) and an analysis of how well the model predicts the actual choices made. However, Train (2003, p) has pointed out that the ratio of predicted to actual choices is not helpful as it ignores the whole concept of probabilities and imposes p=1 on the alternative with the highest predicted utility. Although the IIA assumption is often violated, in the aggregate the MNL model appears quite robust and is the most commonly applied model for analysing choices.

Theoretical expectations and the likelihood ratio test are used to guide the choice of socio demographic variables. The likelihood ratio test (LR) tests the hypothesis that the restrictions imposed on model parameters are valid [419]. In this case, the unrestricted models are those where socio-demographic characteristics are included as interaction terms, and the restricted models which constrain the interactions to 0. The MNL model uses maximum likelihood to obtain estimates; one of the outputs is the log-likelihood function, which is a measure of goodness of fit. The test statistic is:

$$LR = -2[\ln L_{ur} - \ln L_r]$$

with a χ^2 distribution with J degrees of freedom. J is the number of parameters added (e.g. the number of restrictions imposed in the restricted model).

As mentioned above, the main shortcoming of the MNL model [420] is the IIA condition, implying a proportional substitution pattern between choices. A second issue with the MNL model is that it can only take heterogeneity of consumer tastes into account when they correlate systematically with observable variables, the unobservable variations between people is not incorporated. This latter can be accounted for with a random parameters logit (RPL) model. However, despite these shortcomings, it has been shown that the MNL is very robust to these misspecifications and can estimate average preferences satisfactorily [273, 420].

4.12.2. Nested Logit

The NL model is quite popular as it relaxes the IIA assumption while maintaining ease of computation of the MNL model[25]. It depicts choices in hierarchical levels with partitioned choice sets. Within the partitions (branches), IIA must hold, but between the branches the model relaxes the IIA assumption. The nested model can explicitly model 'non-participation' (the no-change choice) [421] (Figure 4-2).

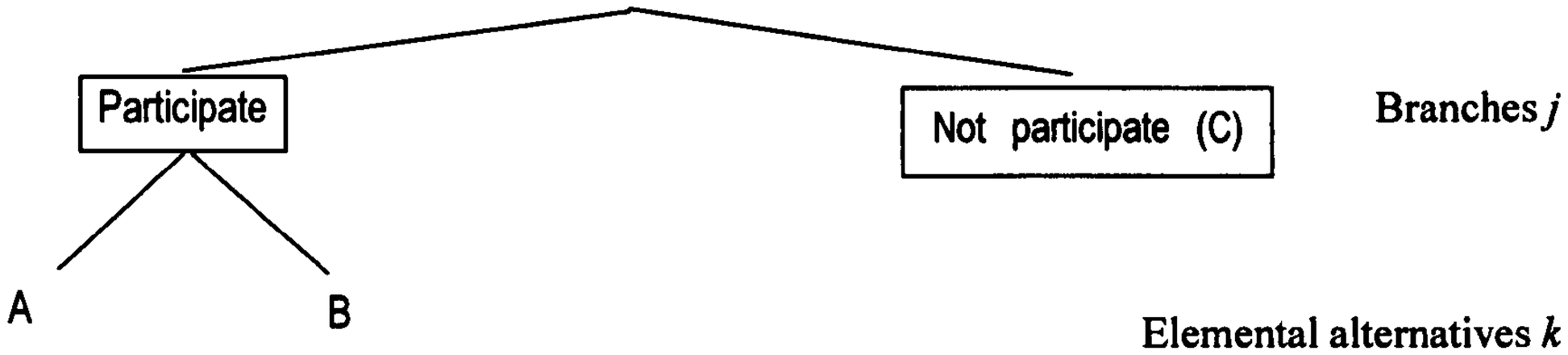

Figure 4-2 NL tree structure

Starting from the utility function defined above in Equation 3-1: $U_i = V_i + \varepsilon_i$, the NL model allows the variance of ε_i to differ between the nests, but not within. This means that ε_i is the sum of the unobservable utility at the branch level ε_j and at the elemental alternatives level $\varepsilon_{k|j}$. The utilities are then modelled separately at the different levels can be partitioned into two choices: 1. Participate, Not participate, with an associated utility U_j; and 2. If participate, which new barrier method alternative, and its associated utility $U_{k|j}$.

$$\varepsilon(j,k) = \varepsilon_j + \varepsilon_{k|j}\ , \quad U(j,k) = U_j + U_{k|j} \quad \text{and} \quad V(j,k) = V_j + V_{k|j}$$

Basically, the unconditional probability of choosing a specific alternative $U_{j,k}$ is the sum of the marginal probability at the branch level P_j and the conditional probability at the elemental alternative level, $P_{k|j}$ [26].

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[25] Some recent applications are [421, 307, 329, 362].

[26] Calculation of probabilities from utility parameters is not as straightforward in the NL model. As they entail extensive equations it has been chosen not to present them or calculate them. Instead probabilities are obtained using the Prob command in LIMDEP.

$$P(j,k) = P_j + P_{k|j}$$ Equation 4-4 NL probabilities

The scale parameter is the part of the variance of the unobserved utility that is allowed to vary between nests (for more detail, see [273] or [421]), and provides the link between these levels. The inclusive value is the ratio of the scale parameters of the upper λ_j to the lower level μ_k.

$$IV = \frac{\lambda_j}{\mu_k}$$

For identification purposes, one of the scale parameters must be normalised to 1, this is usually done at the upper (branch) level. The IV provides the basis for testing the appropriateness of the NL model. The closer to 1 it is, the closer the levels are to having the same variance in their error terms: if it is 1, the model collapses to a MNL model. The closer it is to 0 the greater the perceived similarities are between the alternatives within the nest. To test if the parameter is significantly different from 1, the Wald test is applied:

$$Wald - test = \frac{IV_{parameter} - 1}{std\ error}$$, with a t-distribution.

NLOGIT includes a command for generating NL unconditional utilities and probabilities, and further specification allows for the retrieval of marginal and conditional utilities and probabilities.

4.12.3. Random Parameters Logit

The above models estimate average preferences across the sample population. However, we know that people's preferences differ, i.e. there is preference heterogeneity. Some of this is observed and accounted for by the MNL and NL models above through interaction terms, however it is likely that these observable variables do not capture the entire scope of heterogeneity. This unobserved heterogeneity is commonly accounted for using the RPL model, a more generalised form of the MNL model [305, 312, 278, 323, 326, 327, 281, 331, 339, 346, 359]. The RPL model relaxes the IIA assumption and can account for multiple observations from

respondents, [422] but it cannot incorporate nested decision making processes[27]. The RPL model accounts for both heterogeneity across respondents' observations and in tastes. The model produces a range of coefficient values (preference/taste variations, i.e. marginal utilities) in the population using a distribution and standard deviation.

The coefficient distributions represent different ("essentially arbitrary"[423]) assumptions about the form of preference heterogeneity. Popular distributions are normal, log-normal, triangular, or uniform. The normal distribution is generally the default and models the variation as a function of the standard deviation and is symmetric [423]. The lognormal distribution is often applied for values that should be restricted to positive values, such as WTP values. Triangular distribution is symmetric but models the distribution linearly over the range of the values. Uniform distributions are often used to represent distribution of dummy variables. Fixed parameters essentially model the parameters with a distribution of 0. An insignificant parameter distribution coefficient indicates the parameter can be estimated without the distribution.

Estimation is achieved by simulation. However, the calculation of WTP is more intricate since it is not just two coefficients being divided, as in the RPL and NL models, but two coefficients with distributions around them to obtain a WTP value with a distribution.

Simulation procedure: In running simulations Halton sequences are more efficient than random sequences because they obtain draws that are more evenly distributed over the domain of the distribution. This makes the simulation run more efficiently and allows convergence to occur with fewer model iterations ([424] in [273], [425]). Generally models with more iterations specified are less likely to achieve convergence in more complex models, including RPL models with correlations. Train (1999) has shown that 50 draws using Halton sequences give less simulation error than 500 draws using a random sequence. Henscher, Rose, and Greene, 2005 [273] suggest 25 draws using a Halton sequence is sufficient (p615), though 100 is better. The other advantage is that the same estimates are obtained with each model run; with random draws the output will change each time, making it very hard to compare different model specifications.

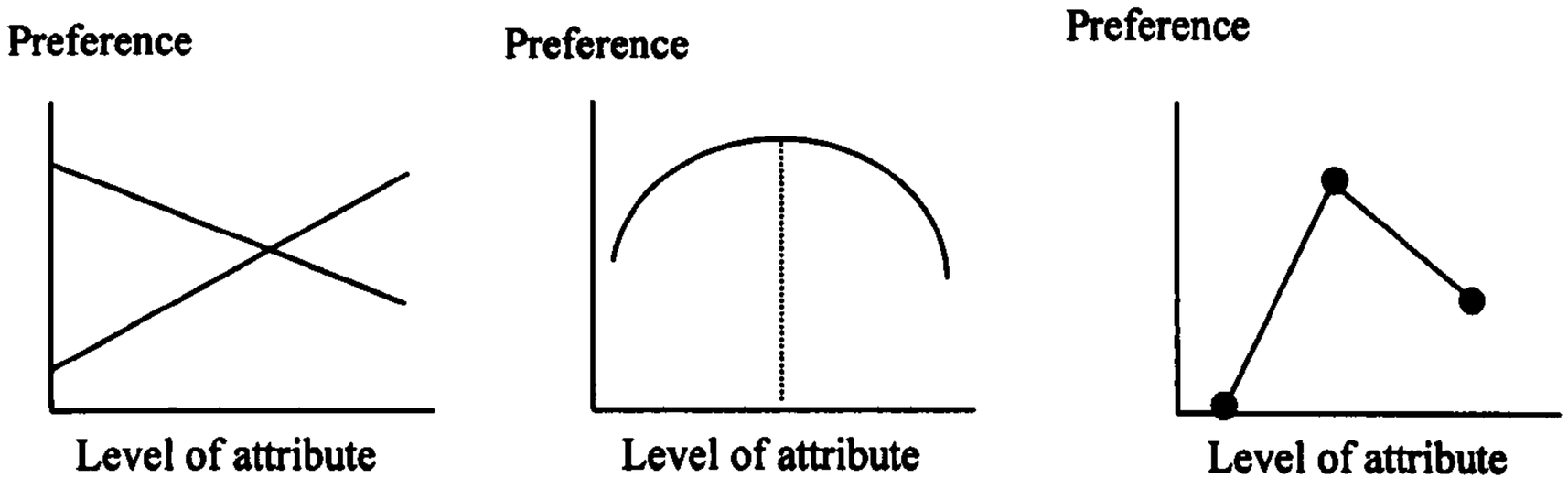
[27] It is for this reason that we will only apply this model to the distribution DCE. Moreover, it will not really be possible to change product profiles so the RPL with correlations model would not provide additional policy relevant information.

4.12.4. IIA testing

Testing for IIA can be done within the MNL model, or in the advanced models. To test for violations of the IIA assumption in the MNL model a test was developed by Hausman and McFadden [426]. It involves removing one alternative from the choice set and testing if the choice probabilities remain constant. There are two problems with conducting this test. First, it assumes a labelled experiment; where removing an alternative means removing something meaningful, e.g. removing bus from the transport modes car, bus, train. In this case, where the experiments are generic, it does not have any behavioural meaning. Second, more than two alternatives need to be in the choice set to be able to remove one and still have a choice. Alternatively, one can assume IIA is violated, precede to the more advanced estimation models, and test for their appropriateness. To check if the NL model is appropriate it is necessary to test whether the branches are necessary. If the inclusive value is between 0 and 1 and statistically significant, the NL model is appropriate. The significance levels of the standard deviations of the random parameters are reviewed to test for violations of the IIA and RPL model.

4.12.5. Attribute functional forms

Green raises the issue of how preferences are modelled [272, 427]. The importance of these preference models is to guide the choice of functional form for the attributes in the equation to estimate utilities. From: Green 1978 and 2001[272, 427]
Figure 4-3 shows three models of preferences graphically and their function forms:



1. Vector model

$$s_j = \sum_{p=1}^{t} w_p y_{jp}$$

2. Ideal point model

$$d_j^2 = \sum_{p=1}^{t} w_p (y_{jp} - x_p)^2$$

3. Part-worth function model

$$s_j = \sum_{p=1}^{t} f_p(y_{jp})$$

From: Green 1978 and 2001[272, 427]
Figure 4-3 Models of Preference

where S_j are preferences for the j^{th} stimulus; W_p are the individual's weights given to the t attributes, and Y is the level of the p^{th} attribute of the j^{th} stimulus; d is the distance from the ideal point X_p; f is the function of the part-worths.

1. In the vector model, preferences are assumed to have a linear relationship with attribute levels.
2. The ideal point model represents preferences where attributes have an optimal level; preferences for room temperature might display such a form, tea temperature would display the opposite form where hot tea and ice tea are preferred to luke warm tea.
3. The part-worth model, the most commonly applied model and the most flexible because it does not impose a specific relationship, can be converted into the other models, and can accommodate categorical attributes. It allows for each attribute level to have its own utility. However, this flexibility is obtained at the cost of predictive validity and reliability, as many more parameters need to be estimated.

4.12.6. Data coding

Effects coding has been used for categorical variables. This means that the coefficients must be interpreted as divergence from the mean. To retrieve the coefficient of the omitted category, we take [-1* sum (coefficients other levels in attribute)]. Not including a constant in the estimation imposes a mean utility of 0[28] [428]. This makes it easier to interpret relative values of the marginal utilities.

4.13. Conduct analysis to answer policy questions

Most DCE study objectives are linked to specific policy questions, linked to estimating social welfare or predicting how products or services would be adopted with different characteristics. For these specific analyses are needed.

4.13.1. Responsiveness of choices to attribute changes: estimation of elasticities

Elasticities can be calculated for percentage changes in the probability of choosing a given alternative in response to a percentage change in attribute level. The formula for individual level elasticities from the outputs of a MNL model is ([257], p59):

$$E^{P_{iq}}_{x_{jkq}} = \beta_{ik} X_{ikq} (\delta_{ij} - P_{iq}) \text{ where } \delta_{ij} = \begin{cases} 1 & if \quad i = j \quad (direct\ point\ elasticity) \\ 0 & if \quad i \neq j \quad (cross\ point\ elasticity) \end{cases}$$

[28] A constant is used for labelled experiments to capture the mean value of the label, however for generic experiments this is meaningless since A and B have no useful meaning, and might only capture a preference for the left hand side option over the right hand side option.

It should be noted that the IID assumption of the MNL model restricts cross elasticities to being equal over all alternatives. Models that relax this assumption need different formulae for calculating elasticities. An additional issue with elasticities is that they do not make sense for categorical variables, because percentage changes have no meaning. In such instances the response of a change to a scenario can be found in the marginal effect. The marginal effect estimates the change in the choice probabilities resulting from a change in the attribute. For example, the impact of choice of transport options if the choice has all the same attributes excepting that it was a car rather than a bus, can then be attributed to the marginal value of car over bus.

4.13.2. Market segments

Market segmentation aims to identify groups of consumers with similar preferences, that then can inform the marketing strategy, including advertising campaigns, where to distribute and package products and at which price [429]. Market segments can be identified either a priori, and tested for relevance within the DCE estimation process by using cross-products of demographic or other individual data with the DCE attributes [430], or *ex post* using either a two-step clustering approach where an cluster analysis of determinants of estimated utilities is undertaken to identify targetable demographic characteristics or a simultaneous approach using ANOVA [431]. Most common is the first approach, where suspected co-factors are included into the estimation procedure [430]. The two-step process is common in marketing, where consumers are first grouped based on purchase intents and product attributes, followed by linking market segments to consumer variables. Alternatively, a mixed model ANOVA can be estimated including both conjoint and consumer variables and their interactions. For more detail on the estimation procedures see Naes [431]. These data can be used to adapt targeted strategies/services for market segments.

4.13.3. Market shares

Utilities of the different alternatives feed into the probabilities of choosing a given alternative. This predicts the choices of the sample population and the market shares in that population. Changes in market shares following the introduction of a new product could also be predicted in this way, although this is contested by Louviere who argues that this is not possible since values are based on hypothetical markets.[257]

4.13.4. Aggregation of preferences for welfare estimation and aggregate prediction

To estimate social welfare and/or uptake at the community or society level, preferences must be aggregated. Methods for aggregating preferences to predict choices are: [432]

- Representative agent: assumes population preferences are the same as sample preferences with average population characteristics.
- Classification: segments are marketed into relatively homogenous groups, then use a representative agent within segments; aggregation is based on weighted averages.
- Statistical differentials: builds on the representative agent method by using the observed variance in preference to model preference heterogeneity.
- Sample enumeration: elicits preferences from a 'representative' sample, then aggregates based on the sum of the individual predictions.

However, all of these methods implicitly assume that the consumers face the same choice set, when in fact not all the alternatives may be available to them. Genc suggests an adjustment to the first three methods to incorporate heterogeneity in choice sets at a population level, and shows this greatly improves aggregate demand estimations.[432]

Lancsar shows that the current methods for estimating WTP and marginal willingness to pay to obtain values of aggregate welfare are not consistent with welfare theory and random utility theory. More specifically, they are only correct if choices were made with certainty, and we know this is not the case [433]. She proposes using a compensated variation approach based on a method developed by Small and Rosen [434]. This method estimates the welfare impact (WTP estimate) by incorporating probabilities of uptake of the different options; that is "the expected value takes account of the change in utility, weighted by the probability of choosing that option." [435]. This is shown to lead to much lower estimates of WTP if the probability of uptake is <1. Ryan shows that for estimating individual level WTP, assuming uptake, the current methods are consistent with theory [435]. However, when estimating aggregate welfare implications of policy changes where there are multiple alternatives that can be chosen by a population, it is important to consider how uptake may vary across the different options.

4.14. Methodological lessons and research gaps

The review of the methodological literature shows that discrete choice methods are very suitable for estimating the impact of different product and distribution system attributes on the demand for new barrier methods for HIV prevention. This method is consistent with

economic theory and provides more detailed information on preferences for specific characteristics than directly elicited methods such as contingent valuation. However, the review highlights the many methodological challenges. The development of the study instrument should not be underestimated. Qualitative research among the sample population is critical to inform the design of attributes, levels and their presentation.

The review of methods clarified that the choice of model depends on the empirical data. These models will be explored for their suitability to the data and their consistency with theoretical expectations. Though the MNL model is likely to generate baseline estimates of women's preferences, these are likely to be refined using more sophisticated models such as NL and RPL models, which can take hierarchical choices and preference heterogeneity into account.

This chapter has highlighted two key gaps in the literature. Firstly, the paucity of rigorous determination of the attribute levels to be used in DCE and lack of guidance applying rigorous and systematic methods for reducing the attributes to a manageable number.

SECTION II: DESIGN AND IMPLEMENTATION OF THE SURVEY

Chapter 5. Thesis aims and objectives

5.1. Introduction

In order for new female-initiated methods to be most effective, it is critical to facilitate women's access to barrier methods for HIV-prevention that suit their situation and needs. As soon as effective new methods are found, it is crucial to ensure access to and use of them as quickly and widely as possible. This study adapts existing economic methods described in the literature review to explore the determinants of women's demand for barrier methods for HIV prevention.

5.2. Aim

This study aims to understand the determinants of urban South African women's demand for existing and new barrier methods for HIV prevention, in order to inform the development of strategies for the introduction and distribution of new methods in urban South Africa.

5.2.1. Specific Objectives

1. Develop methods that can be used to obtain quantitative rankings from women on the attributes and levels to be included in the DCE, linking the qualitative focus group discussions to the DCE design.
2. Explore the existence of market segments, and the variables that define them.
3. Analyse the determinants of women's demand for barrier methods and assess potential substitution from the male condom to new methods.
4. Analyse the determinants of women's demand for distribution and promotion strategies; and the interaction of these preferences with women's characteristics and type of barrier method.
5. Use the findings from the empirical analysis to identify key factors to be considered when introducing new methods for HIV prevention, and propose introduction and distribution strategies for new barrier methods in urban South Africa and elsewhere.
6. Assess if the relative product effectiveness' / risk reductions can be portrayed satisfactorily to allow women in a relatively low literacy setting to make choices that reflect their preferences?

Determinants of Women's Demand

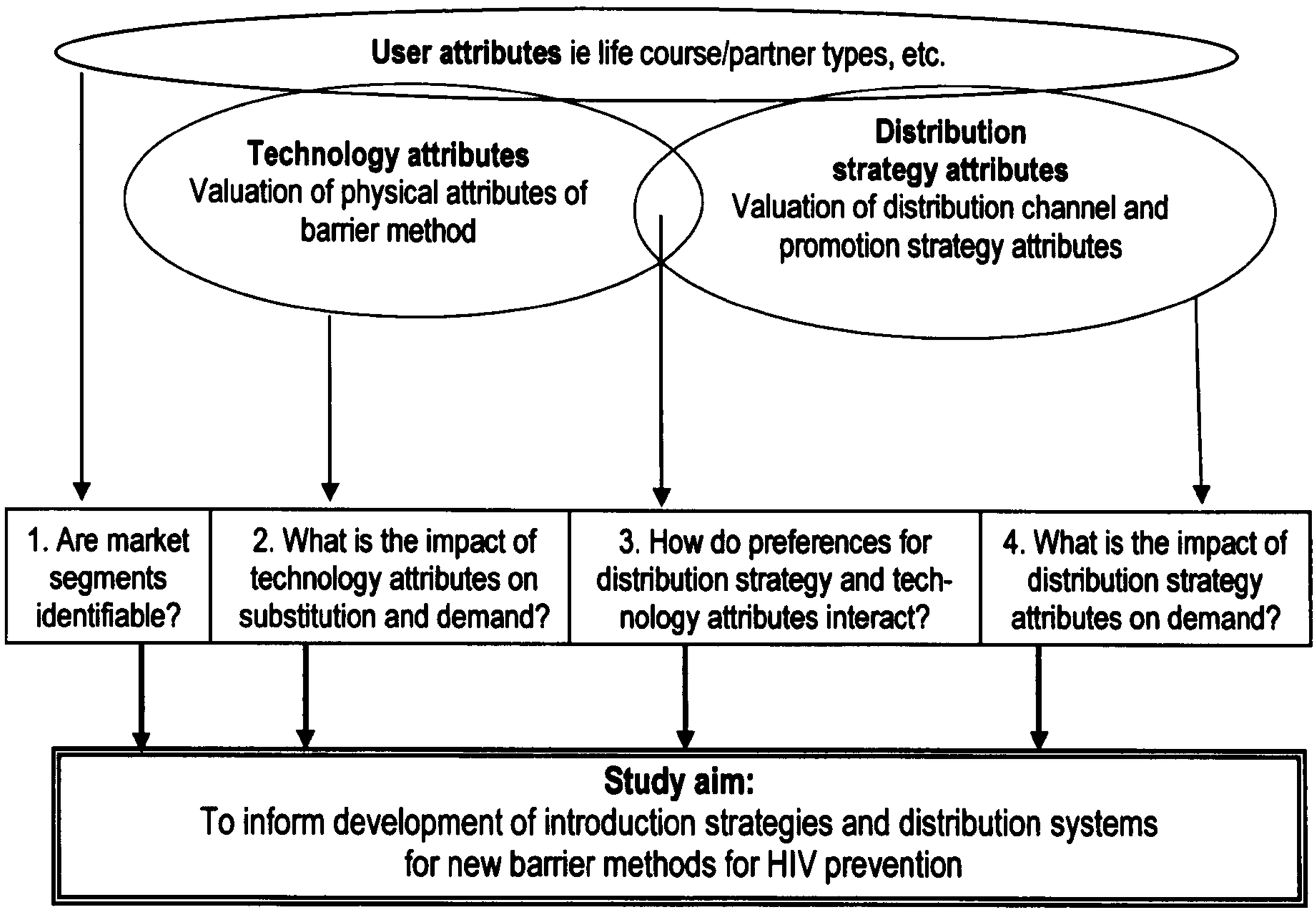


Figure 5-1 Framework for studying the determinants of demand for barrier methods

Figure 5-1 provides an overview of the study and how the components interact. *User* attributes (used interchangeably with individual attributes) include socio-economic status and income, fertility desires, sexual partnership types, risk perception, etc...; *Technology* (used interchangeably with barrier method) attributes include: efficacy, price, discreteness, insertion time, disposal options, side effects, etc..; *Distribution strategy* attributes include: promotional activities, channel type, provider quality and attitudes, privacy, price and opportunity cost, supply reliability, etc. *Country* level attributes include: income, population, HIV prevalence, etc. Cell 1 (Are markets segments identifiable?) will guide policy on the potential identification of user groups with similar preferences to tailor introduction and distribution by user groups. Cell 2 will look at/ predict the uptake of barrier methods by new users, as well as substitution between barrier methods by existing users. Cell 3 will inform whether distribution strategies need to be tailored to the different new technologies. Cell 4 will show where different groups of women prefer to access their barrier methods. Together these components will feed into the ultimate policy aim – to stimulate women's demand for and access to all HIV prevention barrier methods, through the development of improved distribution systems and an introduction strategy for new HIV prevention barrier methods.

These questions are approached through a number of analyses. Table 5-1 details the steps of applying a DCE and how these were operationalised to address our study questions. The theoretical underpinnings of DCEs and a review of different methods were presented in the literature review Chapters 3 and 4. The development of the survey and the DCE survey methods for this study are described in this section (Chapter 6 to Chapter 8).

Table 5-1 An overview of the study steps

Steps	Description and where presented
1. Define study objectives	• To estimate women's preferences for: o product attributes o distribution strategy attributes (Chapter 5)
2. Conduct supporting qualitative study	• 8 focus group discussions, 6 IDIs and 2 attribute identification workshops (Chapter 6)
3. Identify/select attributes	• **Obj 1:** Develop method to reduce attributes and levels to feasible size. o A attribute identification workshop to identify the critical dimensions to be included in the DCE (Chapter 7)
4. Develop and pilot data collection instrument	• Design DCE choice sets (Chapter 8) • Pilot among 100 women (Chapter 8)
5. Define sample characteristics	• Sexually active women aged 18-45 in three urban township locations representing different socio-economic strata (Chapter 8)
6. Choose survey procedure and perform data collection	• 1017 face-to-face interviews conducted by female interviewers using a paper-based questionnaire with DCE choice sets in a flipchart (Chapter 8)
7. Test for reliability, validity consistency and other potential biases	• Assess the generalisability of the achieved sample, and consider for potential biases in the DCE data (Chapter 9)
8. Conduct model estimation and 9. Conduct analysis to answer policy questions	• **Obj 2:** Identify market segments o Key socio-demographic variables to include in the discrete choice models (Chapter 10) • **Obj 3:** Analyse determinants of demand for barrier methods and their attributes, and substitution away from male condoms o The exploration of three discrete choice models (multinomial logit, nested logit and random parameters logit) (Chapter 11) • **Obj 4:** Analyse determinants of demand for distribution channels and promotional messaging o The exploration of two discrete choice models (multinomial logit and random parameters logit) (Chapter 12) • **Obj 5**: Inform new barrier method introduction strategy. o Discuss the implications of the estimated preferences for uptake and distribution of new barrier methods (Chapter 13) **Obj. 6**: consider the interpretation of the risks presented in the DCE (Chapter 13)

5.3. *Justification of study site*

This study took place in Ekurhuleni, an area of greater Johannesburg, South Africa. This site was chosen for a number of reasons. South Africa has hosted a number of new barrier method trials and urban areas tend to be 'fast' adopters of new goods and ideas; these two reasons suggest that urban South Africa is a likely place for early new product introduction. HIV-prevalence rates are high in Ekurhuleni (around 27% in pregnant women) [436]. There is scope for a range of distribution channels, as market segmentation for many goods is the norm in urban areas. There are a number of clinical trials of new barrier methods in Johannesburg, so a recruitment area was chosen that was geographically distant from the sites of these trials. This was to avoid trial participants receiving potentially confusing messages about these new products. The Reproductive Health and HIV Research Unit (RHRU) had experience working in this location and Ekurhuleni's population was sufficiently large to recruit our study participants.

Within Ekurhuleni, three locations were selected for the quantitative community survey, following a discussion with the Metropolitan Municipality Health Department of Ekurhuleni: Zonkizizwe, Vosloorus, and Spruitview. These three neighbouring townships were chosen to reach populations with diverse socio-economic status' as identified by their housing types.

Vosloorus was the largest community, with a population of 159,525 [437]. Vosloorus contributed 73% (742) of participants of the survey. Vosloorus is fairly representative of a South African 'Township", with its range of apartheid era municipal housing, newer Reconstruction and Development Programme (RDP) housing (built within Nelson Mandela's Reconstruction and Development Programme just after the end of apartheid), self-built large homes, and patches of informal settlements. It has two shopping complexes, three government health clinics, and a large youth centre. Zonkiziswe is a newer community, consisting mostly of 'site and service stands' and informal settlements. Site and service stands are government provided plots (sites) serviced with a toilet and a water tap. The residents build accommodation on the plots themselves. It has a population of 32,070 and one health centre. Twenty-three percent of interviews were from Zonkiziswe. Spruitview is the more affluent of the communities in the survey, with primarily self built homes. Its population is 11,262. It has one government health clinic and contributed just 4% (45) of the interviews. In all communities, most inhabitants are African. Spruitview has a very small population of non-African residents.

5.4. Ethics

It was decided to undertake the community survey in a microbicide trial naïve population to ensure that respondents were not confused by the hypothetical choice scenarios that included product efficacy, which has not yet been proven. There was concern that microbicide trial community members may be led to believe that the product they were using in the trials would provide some level of protection against HIV, STI or pregnancy.

All participation in the community survey and its supporting qualitative studies (focus group discussions and in-depth interviews) was voluntary and subject to completion of an informed consent procedure. All information provided by respondents was kept confidential. The informed consent forms for the focus group discussions included an agreement that participants would not discuss the input of the other participants outside of the group. Signed informed consent forms were kept separately from the questionnaires and research outputs to protect the identity of the participants. Participants did not need to use their real names in any of the interview formats, and names were not written down on any study documents. The interviews were held in a private space to facilitate the confidentiality of their responses. Participants in all of the interview types were reminded before starting that they could stop at any time if they felt uncomfortable or did not want to continue. They were also told that if specific questions made them uncomfortable they were not required to answer at all, though it would be helpful if they tried to answer to the best of their ability. The value of the reimbursement was chosen as a token of thanks for their time, not as an inducement to participate.

Funding for this study was provided through the DFID/MRC Microbicide Development Programme. Collaboration with RHRU, who are experienced with research related to sexual behaviour, provided additional support to ensure all activities were conducted according to ethical guidelines. This study was approved by the Wits Health Consortium Ethics Committee and the ethics committee of the London School of Hygiene and Tropical Medicine.

5.5. Overview of data collection

A private research company, Progressus Research and Development Consultancy, was employed to organise the data collection. This resulted in close collaboration between the main researcher, who led the data collection team, and participated in all data collection activities. Qualitative research, using focus group discussions (FGDs) and in-depth interviews (IDIs), was conducted with the aim of developing the community survey

instrument. Subsequently, an attribute identification workshop was held to reduce the broad range of attributes and levels to a feasible number for the DCE, and to identify their best representation for the community survey tool. Within this community survey, data were collected on revealed preferences and willingness to pay using contingent valuation, and a DCE. The quantitative community survey provided data for objective 2 to objective 4of this thesis.

The sequence of data collection process is summarised in Table 5-2. In 2004, an early exploratory focus group discussion was held with participants of the microbicides feasibility study (these women were not receiving any product) to generate ideas for the study. This was not formally analysed, but used to get a sense of issues and reactions to the types of questions we expected to use. Prior to ethics submission, the draft survey instrument was tested at LSHTM among five PhD student volunteers. This, along with colleagues' comments, provided feedback for initial changes prior to ethics submissions in London (LSHTM) and in Johannesburg (University of Witwatersrand) (see Chapter 8). The main qualitative research to develop the survey started after ethics approval.

Table 5-2 The data collection schedule

Date	Interview type	# interviews	# participants
Aug 22, 2004	Pre-test focus group at RHRU	2	8+8=16
2005			
April 22-25	Pre-Test survey LSHTM PhD student volunteers	5	5
June 18	FGD Male and female condom use and partner types	2	14+14=28
June 25	FGD Distribution location and promotional messages	2	12+10=22
July 2	FGD: New technologies	2	12+12=24
July 9th	FGD: New technologies	2	11+11=22
July 11,12,13	IDI: Contraceptive histories	3	3
July 18	IDI: New methods	3	3
July 23	Key attributes workshop	2	11+11=22
July 25	Pre-test valuation survey	2	2
Sept 22	Pilot of community survey and evaluation survey	77	77
Sep 24	Pilot feedback session	1	4
Oct 4-31	Survey	1017	
Oct 4-31	Evaluation Survey	42	

In the coming chapters (6 to 8) methods used to develop and implement the survey will be described.

Chapter 6. Qualitative methods to generate attributes and levels

6.1. Introduction

At the outset of this study, the literature advised the use of qualitative methods to obtain attributes and levels that were relevant to the target group. However, further details of which methods to use and how remained fairly vague. This chapter describes the process of the qualitative data collection and analysis and the various iterations leading to the final design of the DCE. This chapter is a methods chapter, but the methods evolved as a result of the outcomes of previous iterations. Therefore, intermediate results will be reported and the manner in which they fed into the next iteration of methods and the final survey is documented.

The aim of the qualitative research was to inform the design of the DCE survey instruments in a number of ways:

- Identify the appropriate terminology to use to describe the DCE attributes and levels;
- Explore the structure of choice for physical attributes and distribution system attributes (joint or independent, i.e. is this a single choice or two separate choices);
- Identify key attributes to include within the different attribute categories (physical attributes, distribution channel attributes, promotion strategy attributes);
- Explore what may be appropriate formats for the presentation of survey questions for a population of relatively low literacy.

Section 6.2 describes the aims of the qualitative research methods used to collect the qualitative data, Section 6.3 presents the results of the qualitative interviews and how they contributed to the new iteration of data collection. Section 6.4 discusses the qualitative methods and findings.

6.2. Qualitative methods

The qualitative research was an iterative process, with the initial interviews (focus group discussions and in-depth interviews) starting off with a broad question base, and becoming increasingly focussed in order to obtain a feasible yet relatively comprehensive survey instrument.

The qualitative research can be grouped by the topics to be covered:

- Determinants of condom use, partner type terminology (includes partner's influence on condom/contraceptive use).
- Determinants of distribution channel use, promotional messages
- New methods (microbicides and the diaphragm)
- Identification of key attributes and levels

The qualitative research started with rounds of focus group discussion on pre-determined topics: the use of male and female condoms and their use in different partnership types; barrier method distribution types and promotional messaging; and lastly groups on microbicides and the diaphragm. However, the topic guides were revised weekly, to allow for learning of how to write a topic guide and incorporation of previous weeks' findings. The in-depth interviews explored women's decision-making processes in more detail. The decisions around contraceptive and condom use within different types of partnerships and the interaction between choice of distribution channel and choice of contraception technology were discussed in the contraceptive history in-depth interviews. The 'New methods' (microbicide and diaphragm) in-depth interviews elicited the women's impressions of the new methods, and their desirability and feasibility of use, as well as factors that might facilitate the use of existing and new methods. Topic guides can be found in Appendix 1.1.

Although there was flexibility in the types of attributes included in the discrete choice experiment, the attributes still had to inform the pre-determined questions:

- Is substitution between the different barrier methods to be expected?
- What interventions are available to influence the use of methods? The demand for a good is a function of the good's price, the price of substitute goods, and people's tastes and preferences. With this in mind, we aimed to look at the influence of the direct cost of the goods and substitutes, the opportunity costs of obtaining them though different distribution channels, and how to influence preferences through promotion strategies.

The search for critical factors influencing the determinants of women's use of barrier methods concentrated on identifying which factors could be changed through specific interventions. For example, partner type or power relations within a partnership were considered likely to have a strong influence on women's ability to negotiate safe sex. Though we can adjust promotional messages or distribution channels to facilitate women's barrier method use within different types of relationships, changing gender relations is a

much greater endeavour necessitating very different types of interventions. Therefore we sought to balance these influential factors, which are recorded in the background section of the survey, with those factors and trade-offs that provide direct policy lessons. The qualitative research aimed to ensure that the most important factors were included in their respective sections of the survey instrument.

6.2.1. Recruitment for the qualitative research

Eight focus group discussions and six in-depth interviews took place. Participants for the qualitative research were recruited from two sources. The first was from the largest primary care clinic based in Vosloorus. Every fourth woman entering the clinic was approached by the clinic's community organiser and introduced to the study team. The second was from the three communities, where a key informant would approach every 10th door. After a brief introduction to the study and the aims of the focus group discussions, data were collected from those who agreed to participate on their age, home location and contact details. Information sheets were provided to the participants (Appendix 1.2), and eligible women (based on age and home location) were invited to focus group discussions or in-depth interviews the following week. All focus groups were held within a centrally-located health clinic in Vosloorus. Four to five women from each community were invited for each focus group discussion. Transportation was provided to women from Spruitview and Zonkiziswe to the research venue from a central location in their townships. In-depth interviews took place with women who were recruited from Vosloorus, and were held in the home of one of the recruiters.

6.2.2. Focus group discussion procedures

The study team consisted of a field manager, who organised transport for the women, the main moderator, and an assistant moderator, who was responsible for tape recording the discussions. In addition there was a translator, who translated the proceeding simultaneously into notes that could be read by myself and used to keep up with the discussion.

Upon arrival at the location of the focus group discussion, the female moderator welcomed the participants. The information sheet and informed consent form (Appendix 1.3) was distributed to participants and the moderator read it out loud. This explained the study and the importance of their ideas, input and views. They were asked if they had any questions. During the first two focus groups the informed consent questions were completed individually with a female staff member. However, due to the length of time this took, the

questions were completed in a group during the remaining eight focus group discussions, with a staff member reading and explaining the questions. If a respondent answered 'No' to any of the questions, or there were any remaining queries, they were addressed one-on-one. If the respondent answered 'Yes' to the question about willingness to participate, then the signing of the form was done individually. Once the informed consent (both for participation, tape recording and to quote participant anonymously) was complete, participants were given a letter from the alphabet to use as their name throughout the focus group discussion. This was done to allow for linking of quotes to the collected background information (though no analysis on this basis was ever undertaken). Background information was collected on each participant and is presented in Appendix 2.

When all consent forms were signed, the tape recorder was switched on, and the discussion began. Participants were reminded that the confidentiality of the discussions meant that both the views they disclosed and the views of others would not be discussed outside of that group. Women were told they could speak in whichever language they were most comfortable in; the topic guides were translated on the spot by the moderator. The discussion began with an icebreaker; women were asked to use their 'letter' to choose a word that described them. Then the topic was introduced. The discussions loosely followed the discussion guide and lasted two to three hours. After the discussion, the tape recorder was switched off and the participants were offered refreshments. They were thanked for their time and input and provided with 50 Rand as a token of appreciation (Rand 50 = 4.27 in 2005 UK Pounds).

All participants of the focus group discussions signed the informed consent document (Appendix 1.3) in which they agreed not to discuss anything that was talked about during the focus group discussion with anyone outside the room. Transcripts and tapes were kept in an office away from the study site; nobody other than the primary researcher and the survey team had access to these materials. Although individuals did sign that they agreed to be quoted in the publication of data, any such quotations will not be attributable to particular individuals and identification has been obscured. All tapes will be destroyed after the research has been completed.

6.2.3. In-depth interview procedures

Upon arrival at the location of the interview, the interviewer welcomed the participant and explained the study in general, introduced the specific topic of discussion, and explained why we were interested in her views and experiences. The informed consent form was

handed to her and read out loud by the interviewer, who then asked if she had any questions (the informed consent form used can be found in Appendix 3.1). Questions were answered by the main researcher if the participant was sufficiently comfortable with English, and otherwise done in the language of her choice by the South African interviewer. The participant was told that she could use any name she would like throughout the interview, it need not be her real name if it would make her feel more comfortable. The participant was reminded of the confidentiality of the interview, that she could decline to answer any of the questions if she wants, and that she could stop the interview altogether at anytime. If the participant was still interested in participating in the interview then she completed the informed consent form on her own or with assistance from the South African interviewer.

The participant was offered tea, the tape recorder was switched on, and the interview started. The interviews loosely followed the discussion guides (Appendix 3.2), allowing the interviewer to pursue relevant topics and tended to last one to two hours. After the interview, the tape recorder was switched off and the participant was provided with a token of appreciation / reimbursement of travel costs of Rand 50 (= 4.27 in 2005 UK pounds).

6.2.4. Qualitative analysis

Qualitative analysis of the transcripts happened concurrently with qualitative data collection, allowing data to feed into subsequent interviews. Each week one topic was covered in the focus group discussions. The first four rounds of focus group discussion were analysed using an adapted version of framework analysis. This entailed five steps: step 1: familiarisation with the data; step 2: identification of themes that are both obtained from the data and also predetermined; step 3: coding of the text/data; step 4: organising and summarising the data in a table; and step 5: interpretation. Within the same week the first three steps of framework analysis were completed. After the first round of focus group discussions, a coding frame was developed by a senior researcher with expertise in qualitative research (Catherine MacPhail). After the first six focus group discussions and the first four in-depth interviews, an interim analysis was performed (completing step 4 above, organising the data) to determine the attributes and levels to be in the attribute identification workshop, which is presented in the next chapter.

These attributes were also compiled into a draft valuation questionnaire which was tested on two participants in the form of in-depth interviews. Further formal interpretation was not done within the scope of this thesis, as it was not expected to further contribute towards the design of the survey instrument. However analysis of this data using Framework Analysis

was later undertaken by Catherine MacPhail; the paper resulting from this analysis can be found in Appendix 4.

The qualitative data also provided insights into the subsequent interpretation of the survey data; for example, the meaning of parameters of composite attribute levels such as the diaphragm, which embodies a number of implicit attributes and levels.

6.2.5. Issues regarding recruitment and participation to the focus group discussion

Though most focus group discussions went as planned, a few things should be noted. Two of the recruiters decided to participate in a focus group discussion. One woman tried to participate in more than one focus group discussion, but was recognised by one of the moderators and told that was not possible. At one time it seemed that some of the participants had been recruited from a support group for people living with HIV/AIDS. The community health nurse from the clinic, who had been involved in participant recruitment, was talking about the group to two participants before the focus group discussion started. It was felt to be unethical to subject women who were already infected with HIV to discussions/interviews about HIV-prevention without their prior knowledge. Following discussions about this with the chairman of Wits Ethics Committee, the consent form for the community survey was revised to include the statement: "Since this survey is about HIV prevention, some women who already know they are HIV-positive have chosen not to participate. However, women of all HIV status' are welcome to participate". Qualitative results

This section reports the outcomes of both the focus group discussions and the in-depth interviews that took place between June 18, 2005 and July 18, 2005. As the range of topics covered were the same, the outcomes from both types of interviews are reported together to allow both to feed into the understanding of women's preferences for product attributes and their distribution and promotion.

6.2.6. Product attributes of importance

To understand some of the important defining attributes of existing and new barrier methods, women were asked: 1. to describe male and female condoms to someone who had never heard of them; 2. after being shown a gel filled applicator and diaphragm, respectively, what would they want to know before trying it. Below the attributes are summarised with associated illustrative quotes on why they were considered relevant.

HIV prevention: Partial effectiveness did seem understood once explained and clearly affected women's use intentions. After an example describing a 50% effective diaphragm relative to a 95% effective condom:

> *"I would use a condom because it has more percentage"* (18-29 year old, diaphragm discussion).

Women also acknowledged that even a partial effective method is better than no protection:

> *"At least you have that 50% of being protected, it's better than nothing."* (30-45 year olds microbicide discussion)

Pregnancy prevention: As current HIV prevention barrier methods also prevent pregnancy, it was thought that some women would consider this a negative attribute. However, this was only raised once:

> *"I still want to fall pregnant ...and there is no way that I can fall pregnant and you are scared and you want to protect yourself against HIV. There is no other way is either you stay without a child or you risk your life you see that."* (40 year old, new methods in-depth interview)

Among the younger women there was a suggestion to stop using hormonal methods, even that they should not be distributed at all, because younger people then would be more likely to use condoms, since they are more scared of pregnancy than HIV. Descriptive of how, if new products prevent pregnancy, would allow w omen to introduce them with a more "acceptable" excuse for using prevention:

> *"The thing that can make him change is he is afraid of children, because I said that the doctor said I shouldn't drink pills and now I must use condom, because he is afraid that I will get pregnant, he says that the support is too much because he should buy food he inserts it for that sort time and use it because he is afraid of support he says it is too much."* (30-49 year olds, condom discussion)

STI prevention: This is considered an intrinsic attribute of condoms:

> *"This condom makes it possible that we should not get STI's, we protect diseases like infectious diseases and burning urine."* (30-45 year olds, condom discussion)

Secrecy: The ability to use without their partner's knowledge. This came up over and over again as critical.

> *When I use a [female] condom as a female, I'm protecting myself from an unfaithful partner who pretends to faithful and it will safe me from, as we know that people are raped, I wont get sexual infections, and thirdly it will help me not to get pregnant, and I will be a happy woman because I know my secret, I have a female condom so I'm not afraid of anything I will be free..."* (30-45 year olds, condom discussion)

This attribute is discussed in much more depth in the paper in Appendix 4.

It is interesting to note that there was an expectation of lack of cooperation by men. Men are reported to generally oppose the use of contraception, and show an even higher resistance to condom use, especially among the older women.

> *"We don't use anything with my husband because he is thick skinned he doesn't want to know about the condom and he doesn't want me to use contraceptives and he doesn't want me to use anything and now we have seven children."* (30-45 year olds, microbicide discussion)

Reliability: Bursting is a problem with condoms, and the diaphragm looked stronger.

> *"I think I would use diaphragm because condoms bust at times"* (18-29 year olds diaphragm discussion)

> *"I prefer a diaphragm it is stronger than a condom"* (18-29 year olds diaphragm discussion)

Side effects: There were questions about side effects such as rash, damage to self or partner, and cancer.

> *"I want to know is when they want to introduce this gel, don't they think that it might cause some problems in the womb like womb cancer?" (30-45 year olds microbicide discussion)*

Comfort: Issues were raised related to comfort of new products and discomfort associated with existing options. Referring to the female condom:

> *"I once put it in because I wanted to see if its working and the time I inserted it I felt so uncomfortable I just wanted to remove it out."* (40 years old, new methods in-depth interview)

> *"I want to know is it [the diaphragm] comfortable when walking"* (18-29 year olds diaphragm discussion)

Insertion and removal time: There were questions about when to insert a microbicide and how long a diaphragm can be worn? One participant counselled another on wearing a female condom for extended hours.

> "*You know what, if you constantly keep it in your mind that you have something in your vagina it won't feel comfortable, but if you don't even consider that and you are bold about what you've done you wont feel anything and you'll be fine."* (30-45 year olds, condom discussion)

Ease of use: The female condom was considered complicated to insert.

> "*The first time I saw these female condoms I got scared because they are long, and I thought that am I suppose to insert that on my vagina, and when I looked at those instructions that I must help my partner to insert his penis proper inside because of this outside ring, I felt that it was too much for me, I don't want lie to you. Every time when I look at this condom I even become frightened of using it, I'm really scared but I'll try my best next time."* (30-45 year olds condom discussion)

Sound: The female condom was considered noisy. In response to why she did not want to use the female condom again:

> "*It's that uncomfortable feeling that I had and it's a little bit noisy it's like...its disturbing a bit.*" (40 year old, new methods in-depth interview)

Initial identification of key physical attributes and potential levels

From the focus group discussions, a long list of important physical attributes were suggested making it difficult to identify the most critical attributes for decision making. However, HI V prevention, pregnancy prevention, and secrecy appear the most critical issues for women. Knowledge of the current trial expectations and discussion with experts then provided the potential levels for these attributes. The microbicide trial related to this study is powered to identify a 30% difference in effectiveness over and above condom promotion. A diaphragm without gel was estimated to have 55% to 75% effectiveness in preventing pregnancy (personal communication, Naomi Lince, Ibis Reproductive Health). Secrecy only has two feasible levels.

1. HIV prevention: 35%, 55%, 75%, 95%
2. Pregnancy prevention: 0%, 55%, 75%, 95%
3. Can be kept secret from my partner: Yes, No

6.2.7. Distribution channel

There was a pair of focus group discussions specifically on distribution channels for existing barrier methods. The main questions was: "Where do you/ can you get male/female condoms"; Such a question really elicits a list, so was then followed up by: "What makes you prefer one place over another?", which was more conducive to discussion. Women were further asked if they would like to get female condoms in different places than male condoms, and for the new barrier methods they were asked where they would like them to be made available. In the contraceptive history interviews, women were asked where and why they collected their contraceptives from different sources throughout their lives.

There were many attributes of clinics that were considered favourable to women. Clinics distribute products for free, are often located conveniently in the locations, and women have additional reasons for attending clinics.

"At the clinic when I think everybody will go there because when you take the baby for check up you will get it and whatever you are going to do at the clinic you will get it." (30-45 year olds, microbicides discussion)

"It is a place around our section where we stay and we go there every time as woman because I think as woman it [female condom] should be available for woman." (30-45 year olds, distribution and promotion discussion)

"*I'll prefer a clinic because it is for free*" (18-29 year olds, distribution discussion)

"At the clinic its free you don't have to pay money even when I had medical aid I didn't go to a private doctor, beside that the clinic is closer." (age 41, contraceptive history in-depth interview)

The clinic was also considered trusted, for example to not distribute expired condoms.

"The clinics won't give you unsafe things like condoms I disagree they wont give you unsafe condoms."(18-29, diaphragm discussion).

When obtaining products in the consulting rooms the clinic was also associated with privacy.

"Personally I would prefer to get them from the clinic because there is privacy." (30-45 year olds distribution discussion).

Reliable supply was also considered important. Fir example, referring to male condoms:

"There are no times when you won't find condoms at the clinic, they are always available." (30-45 year olds distribution discussion).

However, clinics were not universally preferred. Younger women in particular mentioned the nurses could be unfriendly or judgemental. On nurse unfriendliness:

"In clinics the nurses are too judgmental if you are taking a condom they will ask you are you using a condom even if you go to a person you'll be judged" (18-29 year olds, distribution and promotion discussion).

Other advantages of non-clinic distribution were **time** and **trust** in the product: For young people:

"Clinics are always full and everybody is going to stare at her that she's taking a condom" (18-29 year olds, distribution and promotion discussion)

"I think those condoms that they are selling they are fine because they are available for everybody but for those who are working. Personally I think they are stronger than those free ones and they are safe." (30-45 year olds, distribution and promotion discussion)

"There are people who are very busy working hard then they don't have time to go to the clinic [to get microbicide gel]. And the clinic, there are queues and you wait for a long time" (30-45 year olds, microbicides)

This also was highlighted in one of the in-depth interviews that the clinic takes a lot of time, whereas private providers are much faster. In deed, this seemed to be the main reason for going private (in particular for those with medical aid [health insurance], which means the price they face is equal between either location).

Non-clinical distribution channels were also frequently mentioned, with much more diverse opinions. At the chemist, women have to pay for goods, it can be further than clinic, can have older people serving which can be unpleasant for younger women.

> *"I'll be afraid to buy them in the chemist because I'll find a person who is older than me so I can rather get the free one's than buying."*(18-29 year olds, distribution)

The quality perception varied widely, with some indicating that the chemist provided better quality products because you pay, and others saying that they might be willing to sell expired condoms. Hospitals were identified as helpful distribution outlets because they could be visited under the pretense of visiting friends, rather than to access services for herself.

> *"We were getting injections at Baragwanath [hospital] because we didn't want people to know we were on contraceptives so we would pretend as if we were visiting one of our friends who is sick in Baragwanath"* (33 year old in contraceptive history in-depth interview)

Distribution through family planning clinics was considered a good way to keep men in the dark about the existence of these products.

A number of non-medical outlets were also suggested:

- Library:

  *"*interviewer: Library and why library?*

  **A: Because most of our young stars they utilize the library often then it will be easy for them. Some of them they are scared of going to the clinic so may be at the library they can get what they want."* (30-45 year olds distribution discussion)

- Garage: good because it is anonymous, and:

  "Because of the service hours are okay." (30-45 year olds microbicides discussion)

- Hotels in the rooms, and dressing tables:

  "I prefer the once in hotel because that is were I spend most of my time and you find them [condoms] there and I think they are not the same as the one in the Hospital they can be the same with the ones we buy in chemist so you find them there." (18-29 year olds, distribution discussion)

  This represents both convenience and the type of condom distributed associated with better quality.

- Home delivery: For privacy:

  "*If I go to buy in a chemist and I find an older person maybe she's my neighbour I'll be afraid to go there and buy a condom or to a person who knows me also in clinics I'll be afraid of older people obviously if I take condoms that means I'm sexually active that is why I prefer that they should be delivered at home*." (18-29 year olds, distribution discussion)

- Police station because it is open 24 hours.

- Taxi ranks are associated with a lack of privacy, but it is also a location where most people pass through at some point in the day so is convenient.

- Shops: There were mixed views on quality of shop bought condoms relative to those provided freely in the clinic.

"*The ones you buy even if they expire the owner won't remove them from display because he doesn't want to loose profit.*"

"*they stay for long time there and expire*"

"*the ones we buy in shops are in good condition the one's in clinics I don't trust them*"

"*The ones in clinics bust I prefer the one's in shops they are harder.*"
(both age groups, distribution discussion).

However, shop distribution is not only about quality of condoms, but can also be a comfortable way to collect.

> *"They can place them at the window, after buying something you can take some for yourself."* (30-45 year olds distribution discussion)

- Public Phones: *"because everybody goes there"*

Although less frequent, the participants further suggested the following locations: public toilets (at taxi ranks and garages, workplaces, beachfronts); bottle store (liquor store); shebeen; hair salon; work places; schools in the classrooms; nightclubs; movies; in large gatherings.

Attribute levels for further consideration

Proximity to home or work was also considered important, irrespective of the type of outlet. Levels could be related to time (e.g. walking distance) or related to the transport costs (e.g. 1 taxi ride away, 2 taxi rides away).

Price is important; women reported that if they had no money and or the price was too high, they will expose themselves to risky sex.

> *"I think the fact that you have to pay for them takes us back to the times where women were oppressed I can't get them for free but man can get them for free and we are the one's who are most at risk because we know, as we know we you hear from your man if he says he wants it today and he'll get it so it's better if you get*

female condoms because if he wants it and he gets it you are protected." (18-29 year olds distribution discussion)

However, a purchased condom was also associated with having higher reliability, being stronger and safer.

"I prefer the one you buy because as they say you must not put a condom in a sunny place and at the clinic sometimes it is hot and there are no air conditioners and they are staffed and melting but the one's in shops they are I cool place so they are okay so I prefer the one's you buy." (1 8-29 year olds distribution discussion).

Since distribution channel type are so closely linked to payment and time, with clinic always associated with free products and long waits, and chemist and stores with paying for products and more rapid service, options to try to disassociate these were explored:

- How to collect product: from a discrete box or machine, collect from shelf and pay at cashier, request from behind counter, need individual appointment.
- Waiting time, or distance to outlet.

The need for technology adapted distribution strategies

The interaction between the different products and how they are distributed is explored here.

Female condom specific issues: For female condoms it was not generally felt that the distribution channel would need to differ from male condom distribution locations:

"how are we suppose to protect ourselves if we can't get an access to condom so I would prefer if there [Female condoms] were in clinics and everywhere as male condoms." (18-29 year olds distribution discussion)

Generally, women expressed concerns about the scarcity of female condoms; in the study location, clinic providers rationed the distribution of female condoms to two per woman at any one visit and women stated they were expensive from the pharmacy. This led to limited use. They also expressed a lack of information on use and re-use of the female condom. Additionally the higher price was considered a barrier to use:

"But the problem is when it was introduced we were suppose to buy it, only to find out that the male condoms was free, I think that if it was introduced like that of the males, maybe a lot of women would have adjusted their minds to using the female condom, but you find that if a person is unemployed and at home where would you find the money to buy the female condom, we always say will lets use the male condom, but if the government can sympathize and avail female condoms the same as the male ones, maybe it can help to adjust our minds to use this condom" (18-29 year olds condom discussion)

Microbicides specific issues: There was some debate. Many said they should be widely available like condoms, others said if they are available at the Spaza shops then men will find out what they are and women will loose their secret.

Diaphragm specific issues: Sharing came up a number of times in one FGD. The group thought that the advantage of having to have it fitted is that you would not be able to share it:

> "*Oh this is not like a condom like you can take any. This one you have to go to the doctor and he will measure you and find your size so you won't go around lending it to other people.*" (30-45 year olds, diaphragm discussion).

There was also more concern about the implications of a free diaphragm on people taking care of theirs since it was a durable product, and the issue that if they pay for it they will trust it more. This in contrast to what many women were saying about the price of the female condom being a barrier to even trying it.

The negative impact of too broad distribution channels was mentioned. Women suggested only making the diaphragm available at family planning clinics, so that it can be maintained as a woman's secret.

Conclusions on distribution channels

Respondents were very positive about the clinic as a distribution location, but these opinions might have been biased, because the focus group discussions were held in the clinic, and some participants were recruited at the clinic and/or recruited by the community health worker from the clinic.

Based on these findings, it is clear that it is very difficult to disentangle payments and distribution channels: women associate clinics with free products, and stores and pharmacy with payments. Distribution channel attributes that were important were: Price (payment or free services), privacy, perceptions of quality of products provided by different sources (varies widely between women), waiting time, and travel cost/distance.

Given this, the potential levels for describing distribution could be:

Type of facility:

- Medical (e.g. clinic, GP, pharmacy, hospital)
- Non-medical (e.g. store, public toilet, public phone, taxi rank, library, police station, shebeen, hair salon).

To try to separate out aspects of delivery that were less setting specific, the following options for collection were developed:

- Collect from box or machine
- Request stock in public from person behind counter (receptionist, pharmacist, store owner, etc.)
- Request from person in private space.

6.2.8. Promotional messages

As the second part of the distribution discussion women were asked to put themselves in the position of a nurse or shopkeeper assigned the task to sell either: male condoms, female condoms, microbicides, or the diaphragm. They were then asked what the best advertising message would be to attract women like themselves to buy each product. The male and female condoms were discussed sequentially in the same focus group discussion, the microbicide and diaphragms were discussed each in the separate groups.

Though the vast majority of messages evolved around HIV, STI and pregnancy prevention:

> "*F: *Personally I can say diaphragm it is three in one.* *INT: *Why three in one?* *F: *Because it protects from AIDS, STI's and pregnancy.*" (30-45 year olds, diaphragm discussion)

The new methods also drew attention to the possibility to use them without their partner's knowledge. It was only after prompting about messaging not related to technical use that women suggested other messages. Female condoms are mentioned as stronger than male

condoms, they would not tear. Some messages were suggested around: trust, love and respect:

> *"if you love me respect me use a condom."*(18-29 year olds, distribution discussion)

Only when prompted did women discuss messages around pleasure enhancement or fertility protection to make it easier to introduce to their husbands. With microbicides they did say just to tell their partners it was medicine prescribed by the clinic suggesting a message around vaginal health. The group concluded that, though it would be more difficult to lie to their partners about the use of new technologies if they would be advertised, that they should nevertheless be advertised.

Conclusions on promotion

Though the discussion on promotional messages centred on HIV and STI control and pregnancy prevention, women also identified innovative ways to present the gel to their partners, specifically around presenting it as a women's medicine. They also mentioned that women could either stop using hormonal contraceptives, or lie to their partners that they were not using hormonal contraception, to make it easier to introduce condoms or other products that are contraceptive as a method of pregnancy prevention rather than HIV prevention. In sum, women were innovative in how they present their method for protection.

6.2.9. Price

In the last four focus group discussions on the new barrier methods, women were asked how much they would be willing to pay for: a single use applicator of microbicides or a diaphragm that could be used for up to two years. In practice, during the FGDs, the responses to these questions seemed to be subject to a strong starting-point bias, where the first suggested price set the scene for subsequent suggestions. Table 6-1 shows the first price suggestion and the descriptives of the responses within that group. Most stark is the difference between the two diaphragm groups.

Table 6-1 Proposed prices for new barrier methods by group

Group	First price (in Rand)	Descriptives of all suggested prices	
Microbicides (single use), 18-29 year olds	R10	average	7.1
		median	5
		min	2.5
		max	20
		n=	13
Microbicides (single use), 30-45 year olds	R6,99 for 10	average	1.1
		median	0.9
		min	0.5
		max	2
		n=	4
Diaghragm (reusable for 2 years), 18-29 year olds	R10	average	16.0
		median	10
		min	0
		max	50
		n=	15
Diaghragm (reusable for 2 years), 30-45 year olds	R199	average	136.4
		median	100.0
		min	5
		max	500
		n=	16

It was expected that it would be a challenge to find appropriate price levels that could be used across technologies. This was reconfirmed by the fact that higher prices were suggested for the reusable diaphragm than for single use microbicides. Another challenge identified during the London pretest was the presentation of a fixed and variable component to the price (applicator plus gel, or diaphragm plus gel). With the idea of having an initial cost outlay and a recurrent price being confusing.

Conclusions on price

Identifying a single price scale for all products was proving challenging. Women were suggesting very different prices for the reusable diaphragm and the single use microbicide. This suggests that different price levels between single use and reusable products is needed. The other option might be to present the diaphragm as disposable, or present the cost of two years supply or a per sex act cost of all products to ensure the price attributes are presented in the same units.

6.3. Discussion: developing an objective process for attributes

In this first phase of the qualitative research, a broad list of a attributes was identified. However the appropriate next steps to select attributes was not clear. Although qualitative methods such as contents analysis could be used to identify more and less prominent

themes, after completing the first four rounds of interviews it was felt that such an analysis of counting mentions of attributes would likely be biased by the more outspoken participants' views. A different technique was needed to guide the survey development. It was chosen to use these qualitative interviews to generate an inventory of potential attributes and levels when appropriate and to then allow a next round of participants to rank them. This was thought to provide more objective guidance on what women felt was important to them about the product, distribution and promotional attributes. This second iteration is presented in the next chapter.

Chapter 7. Attribute identification workshop

7.1. Introduction

The literature on how to conduct discrete choice experiments (DCEs) generally recommends qualitative research methods (focus group discussions and in-depth interviews) combined with a review of the literature to identify key factors in people's preferences [273, 267, 268] (see Section 4.4.) The policy relevance of the attributes can provide guidance on which attributes to include[342, 438, 305, 276, 308, 278, 340, 349, 351, 350, 362]. However, there are few specific recommendations on how to distil the possible attributes to a reasonable number that can be included in a feasible DCE. Two studies have used ranking exercises after qualitative research to inform the design of the DCE scenarios. Tanner used a card ranking exercise among women to identify key microbicide attributes from those attributes suggested in the qualitative interviews [354]. De Bekker-Grob asked participants in in-depth interviews to complete and rank a list of attributes for osteoporosis drugs that had previously been compiled from the literature [277]. This chapter describes the process of moving from the qualitative research to a survey questionnaire using a workshop designed to allow women to identify the most appropriate attributes and levels for use in the DCE and the best was of presenting these. The methods are first described (Section 7.2.), followed by their results. I conclude this chapter by discussing the usefulness of this method.

7.2. Methods

During the series of focus group discussions and in-depth interviews it became apparent that many different factors impact women's choices of product and location of purchase. A method was needed to prioritise which dimensions were sufficiently important to warrant inclusion in the DCE. I decided to hold an Attribute Identification Workshop. This workshop aimed to elicit women's rankings and votes on the best attributes and levels. From the qualitative research the lists of attributes and levels were compiled and turned into ranking questions. The women were provided with a 'priority setting' questionnaires (Appendix 5), and each question presented to the full group for discussion. Ex post, attribute identification workshop/ questionnaire is considered a more appropriate name. The women then filled out their own opinions on the questionnaire, assisted when necessary by moderators. Further questions were developed to enable women to express how important different attributes/levels might be to them. The worksheets consisted of eight sections:

1. Background information
2. Physical attribute rankings
3. Understanding of representations of effectiveness in preventing HIV and pregnancy
4. Distribution attributes rankings
5. Distribution channel rankings
6. Further questions on distribution attributes
7. Willingness to pay for single use / disposable diaphragm and microbicides
8. Promotion

In many sections there were ranking questions. An example of such a ranking question can be found in Table 7-1. In this example women first identified the four most important physical product characteristics, then provided a ranking for each of their top four choices: first choices were given four points, second choices three points, third choices two points, and fourth choice one point (Table 7-1). These were obtained from the analysis of the focus group discussions and the in-depth interviews.

Table 7-1 Physical attribute rankings exercise

Attributes	4 most important attributes Mark with X	Ranking of importance: 1,2,3,4 1 = most important, 4 = least important
Vaginal wetness: May make the vaginal a bit wetter		
Etc.		

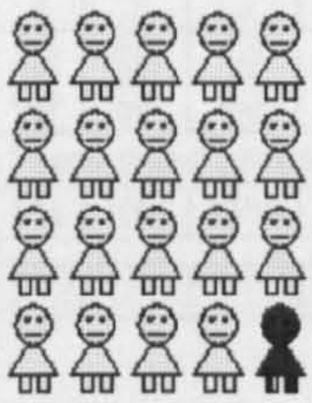
In addition to asking women to rank attributes and levels, women were also asked questions about their understanding of HIV and pregnancy prevention as presented visually. These levels are presented both pictorially and numerically. The first question is shown in Box 7-1. In the pictures the red dolls represented the HIV infections incurred (in the population), and the yellows those that were protected but would have otherwise become infected in the absence of the product. In the numeric representation, it is the level of protection that is presented, both in terms of percentage protection and numbers remaining HIV-negative. This aimed to counter the framing effects (biases introduced by only representing a positive or a negative risk), as is suggested by Edwards [368].

Box 7-1 Pictorial representation of product effectiveness

Please note:  *dolls are HIV-,*  *dolls are HIV+.*

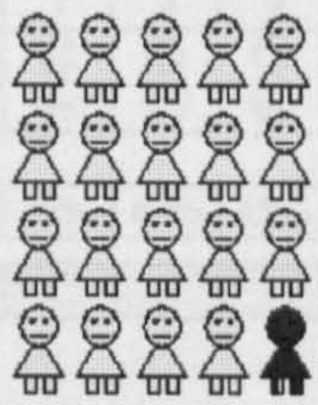
a. If a condom provides 95% protection against HIV, the diaphragm provides *95%* protection, and using neither provides 0% protection, would you use a condom, the diaphragm, or neither?

Male condom___



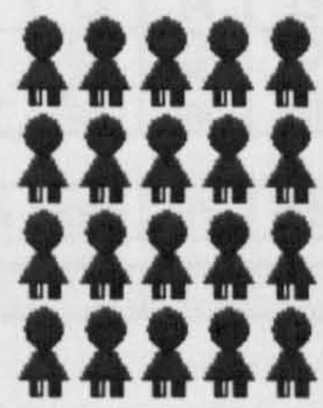
95% protection
19 of 20 women
remain HIV-

Diaphragm _____



95% protection
19 of 20 women
remain HIV-

Neither _____



0% protection
0 of 20 women
remain HIV-

Women were presented with six of such barrier methods scenarios with different levels of HIV efficacy. The different product effectiveness' represented in these scenarios can be found in Table 7-2.

Table 7-2 Variations in of product effectiveness

	Neither	Condom	Diaphragm	Microbicide
A	0%	95%	95%	
B	0%	95%	35%	
C	0%	95%		95%
D	0%	95%		35%
E	0%	95%	55%	55%
F	0%	95%	55%	35%

Subsequently pairs of visual analogue scale type questions were tested for HIV effectiveness to explore women's understanding of the concepts (Box 7-2).

Box 7-2 HIV effectiveness scale

a. What is the lowest level of protection against HIV that you would accept to still choose to use a microbicide? Please put a X in the boxes where you would choose to use a microbicide, starting from the right side.

Number of women that would remain HIV negative at different levels of protection. If no barrier method were used no women would remain HIV negative, if condoms were used all the time 19 would be remain HIV negative																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Percentage protection against HIV																			
5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%

b. What is the lowest level of protection against HIV that you would accept to still choose to use a microbicide? Please put a X in all the boxes where you would choose to use a microbicide, starting from the left side.

Number of women that would become HIV infected at different levels of protection. If no barrier method were used all 20 would be infected, if condoms were used all the time 1 would be infected																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Percentage protection against HIV																			
95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%	40%	35%	30%	25%	20%	15%	10%	5%	0%

Additionally women were presented with a series of questions that aimed to assess the importance of specific attributes or levels. Box 7-3 shows the question aiming to ascertain if reliability of supplied would lead non-use of product or just of seeking the product from another sources.

Box 7-3 The importance of supply reliability

How important is reliability of supply to your choice of HIV prevention method?	
If I cannot find my preferred method the first time, I will use another method or not use any barrier method for HIV prevention? Choice _____	If I cannot find my preferred method the first time, I will go somewhere else to collect it or return another day? Choice _____

Rankings of promotional messages were elicited by the following questions:

a. If you wanted to use a microbicide or a diaphragm with your most recent partner, what would you tell him to make him most willing to accept your use of it? *Please mark in the column 'Best'.* Which message would your partner be least likely to accept? *Please mark in the column 'Worst'.*

b. If microbicides and the diaphragm were advertised on the radio and TV, what message would make them most attractive to you and your partner? *Please mark in the column 'Best'.* Which of these advertising messages would make them least attractive to you and your partner? *Please mark in the column 'Worst'.*

Product study aids are also used at a number of points during this workshop. The beginning women the different barrier methods[29] are circulated for women to touch. Later, product evaluations of eight existing vaginal products and six condom packages are undertaken. These were circulated so women could touch them and consider the products more realistically. Women were encouraged to open the vaginal products to feel the products in their fingers. In additional to actual product aids, visual aids were also used throughout, such as for the presentation of product effectiveness, and in eliciting women's preferences for different packaging.

Women were recruited in the same way as for the focus group discussions and followed the same consent procedure presented in Chapter 6, and were grouped in the same way (younger and older women). By collecting data from each of the 22 participating women it was possible to do a simple descriptive quantitative analysis of the responses. In the next section the results are followed presented by a discussion of how the final choices of attributes and levels were made.

7.3. An overview of women's responses

Two priority setting workshops were held, one with younger women and one with older women. Each workshop had 11 participants, resulting in 22 responses for most questions. The responses to each of the workshop sections are presented below.

7.3.1. Participant characteristics

The average age of the women was 24 years for the younger group and 41 years for the older group. On average, women had 1.78 children. Crowding was low, with 1.86 people sleeping in each room. Twenty-seven percent of the women had not completed secondary school, as opposed to 18% who had. There was high unemployment (36%). Half of the women lived with their last sexual partner. Participants had a range of last partner types: 54% regular partners, 27% husbands, and 18% casual partners. It is noticeable that none of the women reported one-off encounters as their last experience, while in the background

data from the focus group discussions, which was collected more privately, one-off encounters comprised 4% of the total, and casual partners 30%.

7.3.2. Physical attributes

HIV prevention came out universally as the most critical physical attribute, with 21 of 22 women ranking it as the most important (Table 7-3). Interestingly, from the focus group discussions the ability to use something without their partners' knowledge was cited as quite important, but not a single person ranked this in the top four attributes in the first section of the questionnaire. This is where such a ranking exercise can help to identify those factors that are most critical to women.

Table 7-3 Women's rankings of physical attribute importance

Attribute	Rank points
HIV prevention	85
Pregnancy prevention	38
STI prevention	30
Insertion and removal time	14
Comfort	13
Reliability	12
Ease of insertion	12
Reusable or disposable	10
Wetness	8
Product upkeep (washing requirements)	5
Sound during sex	4
Side effects	2
Secrecy	0

Insertion time: Women were asked: "*How long before sex would you like to insert a diaphragm or a microbicide?*" The most popular answers were one hour and six hours, with six and seven responses respectively. Five women wanted to insert them less than an hour before, ranging from three minutes to half an hour. The mean preferred time to insertion was 3.5 hours. In response to the somewhat leading question: "*Is time of insertion important to your decision to use these methods?*", twenty answered "Yes".

[29] Though microbicides do not exist, a real trial applicator filled with lubricant was circulated.

Women expressed a preference for a reusable product (17/22). This was unexpected. During the in-depth interviews, the reasons for this were explored further. Women explained that they expected reusable products to be less expensive. Therefore, the reusability attribute seemed to reflect preferences around prices rather than preferences for reusability in itself, all else being constant.

When asked if they would be willing to try a microbicide or a diaphragm if one of their friends developed a rash after using one, most women were still willing to try (15/22). At the end of the session one woman asked whether toxic shock syndrome, that has been associated with the use of tampons, could also occur with the diaphragm. When asked if she would try the diaphragm if that was one of the possible side effects, she answered that she still uses tampons, so she would still try the diaphragm.

7.3.3. Understanding of representations of effectiveness in preventing HIV and pregnancy

After an introduction to microbicides and the diaphragm, women were presented questions that aimed to identify the best way to present product effectiveness to women (Box 7-1). Eight out of the 22 women consistently chose the condom option. Of these eight, two had not used condoms in their last sex act. When the diaphragm or microbicides were shown to have equal efficacy to the condom (95%), slightly less than half the women switched to a new barrier method: 45% chose the diaphragm, and 41% chose the microbicide. Two women chose a less efficacious method when presented with this possibility: one chose the 35% effective microbicide over the condom, and one chose the 55% effective diaphragm 55% over the condom. However, when all the products were presented together (35% effective microbicide, 55% effective diaphragm, 95% effective condom, and 0% effective none), all the women chose the condom. The two cases of switching with the addition of the forth option, are violations of the assumption of independence of irrelevant attributes, which states that adding an alternative will not affect the choices probabilities between the other alternatives. Or it might just show unstable preferences.

Subsequently pairs of visual analogue scale type questions were tested for HIV effectiveness to explore women's understanding of the concepts. It was a challenging question for women. Firstly the scales were not perfectly consistent (this was not intentional), with one running from 5% to 100% protection and the other from 0% to 95%. Secondly, providing consistent answers meant looking very closely at what was being presented and thinking about what it meant, as the same thing was presented in opposite

terms. Although 12 of 21 and 15 of 21 pairs of responses to this question relating to microbicides and diaphragm effectiveness, respectively were within 10% of each other, this strongly suggested that this type of representation of effectiveness was quite confusing.

One of the intentions of this workshop was to explore the willingness to accept pregnancy prevention among women who wanted to become pregnant; however only two of 20 women responded that they did not want a method that also prevents pregnancy. This made the group responding to the follow-up question very small. Moreover, it seemed that these two women had not understood the adapted visual analogue scale used to represent efficacy in preventing pregnancy: they both marked 95% as the lowest they were willing to accept.

7.3.4. Distribution attributes rankings

Different types of distribution attributes were presented and can be found in the left column of Table 7-4 (for the full description of these attributes see Questionnaire Section 3 in Appendix 5). Women were asked to rank the three most important attributes in their decision making, with one being the most important and three the least important. These were then given a weight of three for the top choice priority, two for the second, and one for the third most important attribute. Subsequently an aggregate ranking was obtained. "Facility type general" indicated whether or not it was a medical facility. Another question explored whether the specific type of facility (i.e. pharmacy versus clinic versus supermarket) was important. From this ranking it appears that the more general delineation of medical versus non-medical is most important, followed by the characteristics of the people who assisted at the facility. Collection method and reliability of supply tied for fourth place. A caveat needs to be raised concerning the attributes placed at the top of the list, which were often ranked as most important and may therefore be subject to an ordering bias. There is less doubt about the importance of type of assistance, because it was near the bottom of the list, and still many people ranked it as important.

Table 7-4 Women's rankings of distribution attribute importance

Distribution attribute	Votes	Rank
Facility type general (Medical/ non-medical)	42	1
Facility type specific (e.g. pharmacy, clinic supermarket, etc.)	17	3
Collection method	15	4
Supply reliability	15	4
Opening Hours	8	5
Waiting time	0	7
Distance	8	5
Privacy	8	5
Assistant	20	2
Collection frequency	6	6

After this general ranking more specific questions were asked relating to these attributes and their importance.

7.3.5. Distribution channel rankings

Women could vote for the two places where they were most likely to obtain their barrier methods, as well as the two least preferred places. Women were most likely to collect from the clinic (15/44) and the family planning clinic (10/44) and least likely to collect from shabeens (informal township bars) or taxi ranks (Table 7-5). There were very strong preferences for clinic and family planning clinics. The votes for the least preferred locations were more widespread. Two women marked clinic as their most and least likely locations, suggesting the question was not very clear to them.

Table 7-5 Women's votes for locations to collect barrier methods

Most likely locations	Nr of votes	Least likely locations	Nr of votes
Clinic	15	Shabeen (informal bars)	7
Family planning	10	Taxi rank	5
Private GP	5	Garage	4
Hospitals	4	Supermarket	3
Awareness campaigns	2	Schools in classrooms	3
Supermarket	2	Public phone	3
Home delivery	1	Nightclubs	3
Library	1	Hair salon	3
Pharmacy	1	Library	2
Public phone	1	Clinic	2
Shops	1	Bottle store	2
Taxi rank	1	Work place	1
		Shops	1
		Public toilets	1
		Movies	1
		Hotels	1
		Home delivery	1
		Awareness campaigns	1
TOTAL	44		44

7.3.6. Further questions on distribution attributes

Women were asked which was more important: the type of facility or the method of collection (e.g. from a box, in a private room, from a person behind a counter); 71% (15/21) responded that the type of facility was more important than the collection method.

Supply reliability: One-third of the women reported that they would resort to another method or no method if they did not find a particular product the first time they tried to collect it, while two-thirds said they would try to get it somewhere else or return another day.

Opening hours: Two-thirds of the women reported that they could predict when they would need their product of choice and could collect them within regular office hours, while the remaining one-third needed more flexible hours to ensure that they would use that method.

Waiting times: Women reported a willingness to wait a maximum of between four minutes and four hours to receive their preferred HIV prevention product, with an average of just less than an hour (0.9 hours).

Travel distance: From the focus group discussions it appeared that distance was expressed in walking time or the number of taxis needed to reach a location. Women did not show great willingness to go very far to collect their preferred method; 81% said they would not be willing to take a taxi ride (Table 7-6).

Table 7-6 Acceptable travel distances

	Frequency	Percent
30 minutes walk	10	45.5
1 hour walk	8	36.4
1 taxi	3	13.6
2 taxi rides	1	4.5
Total	22	100.0

Privacy: Although privacy during collection was raised in the focus group discussions, in this questionnaire 73% of women reported that they did not care who saw them during collection (Table 7-7). Only one would have refrained from collecting the product in the presence of others.

Table 7-7 The importance of privacy

	Frequency	Percent
I would not collect it if I might be seen by others.	1	4.5
I do not mind being seen by people like myself, but would not collect if there were many different people around[30].	5	22.7
I do not care who sees me collect it	16	72.7
Total	22	100.0

Assistance: The characteristics of the person providing the product ranked as the second most important factor in women's decisions concerning barrier methods. However, when

[30] The four women who defined 'people like myself' each had a different definition: people as young as me and in the same situation as me; HIV positive; not men and children; young people.

presented with the question: "*How important is the person giving you your preferred HIV prevention method?*" Eighteen of the 22 said they did not care who gives them their method. It is difficult to reconcile these contradictory responses. It might be slightly different wording, or description of the service attribute. On one of the questionnaires, a comment in Zulu next to the question about privacy said: 'I should not care about other people'. This suggests that their response to the later question reflects more what they desire to be true, i.e. 'I *should* not care'.

Collection frequency: How often women were willing to collect their HIV prevention products varied a lot from woman to woman, with a small peak at once a month (Table 7-8).

Table 7-8 Preferred collection frequency

	Frequency	Percent
Twice per month	3	13.6
Once per month	7	31.8
Once per 2 months	3	13.6
Once per 4 months	2	9.1
Once per 6 months	5	22.7
Once per year	2	9.1
Total	22	100.0

7.3.7. Willingness to pay for single use / disposable diaphragm and microbicides

The willingness to pay question asked women their willingness to pay for products per sex act. This question posed a lot of problems because WTP *per sex act* for both disposable and reusable products was being elicited. This meant a jump in reasoning for reusable products: i.e. not just asking directly the price but the price divided by the number of times it would be used. It seemed women were willing to pay for a single use product (which is then equal to a per sex act price), but their total WTP for a reusable product plus supplies was much higher (row 2 and 3), while the question had elicited per sex act willingness to pay rather than for the full product. This suggests they interpreted the question as their WTP for the full purchase of the product, which would have been a more intuitive question for most women.

The WTP responses were very skewed, which can be seen from the large difference between the mean and median WTP values in Table 7-9. The average reported WTPs for a single use microbicide arguably seems quite high, as a WTP of almost R15 per sex act is about 50% higher than the price of the most expensive condoms on the market, with Durex costing R29 for three. The median WTP values seem more reasonable, though still higher than one would expect in this population.

Table 7-9 Willingness to pay per sex act

In your current situation, what is the maximum you would pay per sex act for the following:	Mean (In Rand)	Median	(Min- Max)
A single use microbicide	14.95	10	(1- 50)
A microbicide in a reusable applicator with a tube of gel	47.50	20	(5- 600)
A diaphragm with gel that you could use for 2 years	50.77	40	(2- 200)
A disposable diaphragm	23.52	8	(1- 200)

7.3.8. Promotion

Women's preferences for promotional messages were elicited both as the message women thought would make it easiest to introduce to their partner and the best way to advertise it using mass media. The potential promotional messages women could choose from can be found in the left column of Table 7-10.

Table 7-10 Promotional messaging a: Descriptions of product to make partner most willing to accept

Best	Votes	Worst	Votes
It prevents HIV	16	It's a cool new sex toy	10
It prevents pregnancy	4	Its for a fresh vagina	4
It prevents STI	3	It prevents HIV	3
Its for a fresh vagina	2	It is for a healthy vagina	2
It is for a healthy vagina	1	My doctor told me to use it to stay healthy	2
My doctor told me to use it to stay healthy	1	It increases sexual pleasure	2
It increases sexual pleasure	1	It prevents pregnancy	2
It will protect my capacity to have children in the future	1	It will protect my capacity to have children in the future	2
		It prevents STI	1
		Its for vaginal hygiene	1
TOTAL	29		27

Most women marked one best and one worst message, but seven women marked two of each. In the latter case, their votes were not qualified in terms of 1st and 2nd best/worst answers. Therefore these women got two votes (represented by the fact that the totals are greater than 22). HIV prevention clearly comes out as a frontrunner in terms of the "Best" message, both to tell partners themselves and for public advertising. 'It's a cool new sex toy', was rated as overwhelmingly unattractive.

For advertising messages, healthy vagina and sexual pleasure tie for 2nd and 3rd place in both the best and worst advertisements (Table 7-11). This suggests that different messages appeal strongly to different populations groups; however the sample is very small.

Table 7-11 Promotional messaging b: Public advertising messages

Best	Votes	Worst	Votes
It prevents HIV	14	It's a cool new sex toy	11
It is for a healthy vagina	3	It is for a healthy vagina	3
It increases sexual pleasure	3	It increases sexual pleasure	3
It prevents STI	2	Its for a fresh vagina	2
It's a cool new sex toy	1	It keeps women healthy	2
Its for a fresh vagina	1	It prevents STI	2
It keeps women healthy	1	It is for a healthy vagina	1
It prevents pregnancy	1	It prevents HIV	1
It will protect women's capacity to have children in the future	1		
TOTAL	27		25

Promotional images: In search of a successful image to represent HIV and pregnancy prevention, some sample images were presented. The images were not very diverse, and the responses were not especially interesting. The LoveLife banner made most women think of HIV prevention products (10/22), while a picture of people embracing made them think of contraceptives (13/22). Nobody marked the picture of a boy and girl leaning up against each other.

Product evaluation: Women were shown eight pictures of products and asked for their impressions. The images are in the left column of Table 7-12. In addition, seven vaginal products and six condom brands available in the South African market were circulated for

feedback (Table 7-13). Not all the women filled in all the questions; therefore a total of the number of votes is also presented. Note that 'Healthy Vagina' was the 1st column, which may have contributed to its high ranking. Though not collected, it would have been interesting to have collected information on actual use of existing vaginal products.

Table 7-12 Women's reactions to product images

Product	Healthy vagina	Fresh vagina	Vaginal hygiene	Increased sex pleasure	New sex toy	Total responses	Willingness to try	Partner willing to try	Most attractive	Least attractive
	**6**	1	1	1	1	10	9/18	9/18	5	9
	**7**	3	3	3		16	14/19	12/17	**12**	3
	**4**	**4**	**4**	2		14	10/16	9/18	9	1
	**3**	1		2	2	8	7/17	4/17	3	10
	2	**3**	2	2	2	11	12/18	4/16	6	2
	**3**	2	1	1	1	8	6/17	4/16	0	6
	**4**	1	5	2	1	13	12/17	8/16	5	2
	2	**4**	1	2		9	7/17	5/17	4	**11**

Table 7-13 Women's reactions to some currently available vaginal products

Product	Healthy vagina	Fresh vagina	Vaginal hygiene	Increa-sed sex. pleasure	New sex toy	Total respon-ses	Willing-ness to try	Partner willing to try	Most attrac-tive	Least attrac-tive
A. Intimate Vaginal Cleanser: Rooibos & herbal extract	6	7	3	2	1	19	18/20	17/20	8	**9**
B. Intimate Vaginal Cleanser: Tea Tree & herbal extract	**9**	8	3	1		21	15/21	14/20	5	8
C. Intimate: personal lubricant	**7**	3	6	1		17	14/21	12/21	8	1
D. Regard: lubricating jelly Glycerine 6%	**8**	4	2	4	1	19	16/21	17/21	0	8
E. K-Y Lubricating Jelly Glycerine 11,25%	**7**	1	5	1	2	16	12/20	12/20	1	8
F. K-Y GEL Personal Lubricant	**8**	3	3	3	1	18	14/20	15/19	5	3
G. at LAST for Women	**7**	3		6	1	17	14/19	16/19	7	0
H. Afrodite libido gel for her	5	3	2	**7**	2	19	20/21	21/21	**9**	2

Product Intimate Vaginal Cleanser (A) was rated least attractive by the largest number of women, but it also ranked as second most attractive. Afrodite Libido Gel (H) had the highest number of women who said they would try it, and all reported that their partners would be willing to try it. It was the product that was voted 'most attractive' by the largest number of women (9). It also resisted the draw of the first column (healthy vagina) with 7 out of 19 women saying that it made them think of increased sexual pleasure.

Table 7-14 Women's reactions to some existing condom packages

Product	Willingness to try	Partner willing to try	Most attractive	Least attractive
I. TRUST studded	11/15	10/15	2	4
J. LoversPlus coloured and flavoured (yellow box)	15/18	15/18	7	3
K. LoversPlus (purple box)	12/14	10/13	5	3
L. Durex Performa: for longer lasting pleasure	13/16	13/16	**10**	2
M. Contempo Rough Rider studded for extra sensation	8/16	7/17	2	5
N. Choice	10/16	9/14	2	**6**

Coloured and Flavoured LoversPlus (J) condoms had the highest number of women and partner's willing to try. The most expensive condoms, 'Durex Performa', were rated most attractive, and the free government condoms 'Choice' were rated as least attractive. However women were more willing to try them than the very explicit 'Contempo' with a large busted blond woman on the package.

7.4. Identification of key attributes and levels for the survey tool

Using simple descriptive statistics of the individual women's responses it was possible identify how women rated the importance of for the different product, distribution and promotion attributes.

7.4.1. Physical Attributes

From these data, HIV prevention rates emerged as much more important than the other physical attributes, followed by pregnancy prevention and STI prevention. STI prevention was not included in the interest of brevity as it came out as less important than HIV and pregnancy prevention. Secrecy did not emerge as important in contrast to women's narratives in the focus group discussions. Nevertheless, as this is a much discussed attribute in the literature, it is included as an attribute in the DCE.

7.4.2. Distribution attributes

Direct comparison of distribution attributes shows that facility type is very important. It is unlikely that facility general and facility specific were very clear to people. Though the characteristics of the person assisting them when collecting product was ranked second most important, further questions do not suggest it would be a major deterrent to accessing barrier methods.

7.4.3. Promotional messages

Though the results of the questionnaire on promotional messaging is more difficult to interpret, a few conclusions can be drawn. The product that women marked as 'Pleasure enhancing' appeared easiest to introduce to women and their partners (Afrodite libido gel for women). However, of the two sexual arousal products presented the product presenting the more feminist message (*At LAST, for women, developed and manufactured by a female medical doctor and homeopath*) was less popular. This also held for male condoms: "Durex Performa for longer lasting pleasure" was rated by the most women as most attractive. "Choice" condoms, the only one that mentions prevention explicitly, was considered least attractive by the most women.

7.5. Discussion of methodology

As noted previously, the DCE methodological literature does not provide much guidance on how to move from the vast qualitative data obtained through focus group discussions and/or in-depth interviews to the final choice of attributes. While Coast et al describes their process using constant comparative analysis of in-depth interviews to reach saturation, most studies remain vague and thus provide little guidance on the best way to proceed. In this study it was felt that the theoretically based qualitative analysis techniques did not provide sufficient guidance on how to prioritise attributes for inclusion in the DCE and instead we developed a new method to identify attributes. Our experience suggests that a systematic approach for allowing women to prioritise what is important to them in a quantitative but simple manner.

However, this method does have limitations. Although the sample size was seemed satisfactory for the purpose, it has to be acknowledged that it is small. Moreover, the ideal physical layout is a challenge. It was considered advantageous to seat women around a table to allow for discussion, however this does limit the amount of privacy that women have in noting down their responses. Though each woman had an individual questionnaire to complete, women were seated close together and it may have been possible for women to see each others' responses. This may have mattered, in particular for reported condom use. Another question to which the answers were unexpected was that 68% reported using a condom in their last sex act. This question was intentionally placed in a row of questions such that it might not be as easy to identify in a glance by neighbours, but this may not have been sufficient, or the participants were a selected group of women with very high HIV prevention behaviour. If repeating such an exercise, it is recommended to seat women on desks with some space in between each other to allow for higher levels of privacy.

Despite this, the inclusion of the key attribute workshop provided a relatively simple and objective way to identify the attributes most important to women. It used rankings of attributes and levels that were generated through qualitative research simple choice questions to generate quantitative outcomes. Simple descriptive statistics provided objective summaries of the different dimensions of women's preferences. This approach may be a useful methodological addition to the DCE literature. Further application of this method in DCE research will help identify the rules of thumb about the number of participants and the process of ranking needed.

Following this workshop, the draft survey was pre-test, revised again, piloted and finally implemented. The lessons from the intermediate iterations and the community survey procedures are presented in the following chapter.

Chapter 8. Community survey finalisation and implementation

8.1. Introduction

After undertaking the qualitative research and an attribute identification workshop, the survey was pre-tested, revised, piloted, revised, finalised and implemented. This chapter presents this process.

Section 8.2 describes the methods, Section 8.3 presents the experimental design of the DCE. Section 8.4 describes the survey sample and sampling procedures. Section 8.5 gives an overview of the final survey instrument. The survey implementation procedures are presented in Section 8.6, and Section 8.7 is a discussion.

8.2. Methods

Revision of the study instrument was undertaken in a number of steps.

8.2.1. The pre-test

A draft questionnaire was developed from the workshop analysis. Two in-depth interviews were used to test the proposed attributes and levels [31]. These highlighted a number of issues:

- After the sixth scenario, women start getting bored and tired. When probed into why they made their choice, many of the reasons that were put forward were not based on attributes present.
- Distribution and promotional attributes were rarely (only once) mentioned as critical to the women's choices when presented as part of a scenario including physical attributes.
- The dolls presenting HIV and pregnancy risk did not appear to make much difference from risk represented by percentiles.
- The concept of really thinking back to their last sex act was extremely difficult. This is best illustrated by an example. The interview was with an eight-month pregnant woman, who had had sex for the last time two months before. When probed about how she made her choice, she said it was because of the higher level of protection against pregnancy. When probed further, pointing out that in her previous sex act she was already 6 months pregnant and already knew she was

[31] A pre-pilot of the very first draft valuation survey was held among volunteers who are members of the HIV network, a group of students with an interest in HIV at LSHTM.

pregnant and you cannot get pregnant again, she maintained her choice and the reason for her choice.

- Price never seemed to be a limiting factor, even with these young women, out of work, who had never used contraception before, and even at a price of R10 per sex act.

It was necessary to make a decision whether to present promotion and distribution within the same choice sets as physical attributes. From the pre-test it became clear that physical attributes dominated women's choices. The combination of physical and distribution attributes together in one large DCE scenario was cognitively too complex. A supporting analysis of demographic and health survey (DHS) data from South Africa (1998) was undertaken to explore the choice of specific contraceptive method and the choice of distribution source. This analysis could not reject the null hypothesis that they were independent decisions. Therefore the choice was made to split the two topics and undertake two separate, simpler DCEs.

8.2.2. The pilot

8.2.3. The pilot implementation and lessons

The pilot was held in one EA in Vosloorus and one in Zonkiziswe over two days. Following the training, each fieldworker was responsible for four interviews. This was not fully achieved, resulting in 77 interviews rather than 80. There was a preliminary analysis of the pilot data to identify problems, including estimation of a very preliminary utility function using a multinomial logit choice model. The pilot provided data on the extent of similarities between our participants and the representative sample in the Nelson Mandela study [31], and also provided an opportunity to revisit our sampling strategy, described above. It was deemed suitable. During the pilot, an evaluation survey was also piloted among seven participants. Feedback from the evaluation survey was disappointing; few women provided criticism or suggestions for improvements. All pilot participants were given information slips, asking if they were willing to participate in a debriefing focus group discussion. In contrast to the qualitative focus group discussions, where participation was overwhelming, it was difficult to recruit these randomly selected pilot participants for this focus group. This suggests differences between the participants of the earlier focus group discussions and the sample of women randomly selected from the population. However, the team managed to gather four women, two of whom had already participated in the evaluation survey. We also had a feedback session with the fieldworkers.

The pilot raised a number of issues and, if necessary, how they were subsequently addressed in the community survey instrument.

- There were many households that did not have women of the eligible age group: i.e. only grandparents and children, or men.
- Some husbands wanted to sit in on the interview. We agreed to discontinue an interview if the partner was present.
- The question on the number of rooms used for sleeping was interpreted differently by respondents. We changed it to two questions: total number of rooms in house, then number of rooms used for sleeping.
- Some women did not like the questions about asset ownership: 'You came to ask me about sex; why do you want to know if I have a fridge?' One woman in the feedback session also reported feeling bad because of all the things she did not have. People were insulted to be asked if they had a donkey as it is considered a sign of poverty. We did not find anyone with donkeys, sheep or cattle in the pilot data, so we removed the donkey question. We strengthened the introduction to the asset index question to cover the reasons for collecting data on assets.
- HIV knowledge was much lower than expected. It was decided to distribute an information booklet to participants.
- Risk reduction pictures were considered easier than pie charts. However, the pictures of the dolls were found to be distracting, so they were simplified to exclude the faces and outlines (see survey instrument in Appendix 6.1). Respondents reported using the percentages in number values more than the pictures in their decision-making.
- The distribution attributes worked fine, but a more recognisable image for 'chemist' was found.
- The message that microbicides and diaphragms are currently undergoing testing, and it is not yet known whether they reduce risk, was difficult to get across. Questions were added at the end of the questionnaire to ensure women did understand that their efficacy was unknown, and to identify if reiteration was needed.
- The scenarios seemed to be well understood. However, some women found the choices difficult.
- The orthogonal design produced a design with 50% of scenarios with product 1, and 25% with each of the others, resulting in a loss of level balance.
- In the pilot the female condom was product 1, which did not have all the attribute levels. Product 1 was changed to microbicide, which can take on all the values of the other attributes, to reduce the number of scenarios that needed changing for realism.

- Some fieldworkers received complaints about the length of the interview.
- The questions on best HIV and pregnancy prevention attributes were too easy and did not make women look closely at the images. The question needed to identify whether they had understood or not before they were presented with the scenarios. The order was changed so values were not consecutive.
- Both in the evaluation survey and in the pilot feedback, it became clear that people considered secrecy as an intrinsic product attribute, and not subject to change. The picture accompanying the secrecy attribute was not very self explanatory either. Though no solution to this was found, it is considered in the interpretation of the DCE results on preferences for product attributes.
- The evaluation survey contained many of the same questions as Section 4 of the questionnaire, but the fieldworkers were getting more critical responses. Participants seemed to be protecting fieldworkers, with the impression that we were there to verify what they had done.

Following the pilot, the questionnaire and the evaluation survey were revised. The included attributes and levels in the DCE were not changed.

This completes the discussion of the preliminary work done to develop the quantitative survey and the DCE scenarios. The following section describes the final instrument, and the survey implementation.

8.3. The experimental design

8.3.1. Finalisation of the DCE attributes and levels

Compilation of the final attributes brought together the priority setting interviews with practical considerations raised in the pre-test of the valuation questionnaire, and consideration of relevant policy questions identified in the literature. The two most commonly cited physical attributes were included: HIV and pregnancy. Despite the fact that secrecy did not receive any votes from women in terms of importance, it was included because the social science literature defines it as critical to women's ability to use these products.

The most frequently cited distribution attribute (medical or non-medical facility) in the attribute identification workshop was considered too vague for people to conceptualise and

was suspected to be subject to rank-order bias, therefore a similar concept pin-pointing a specific type of facility was chosen (e.g. clinic, pharmacy, supermarket and corner shop). The second most importantly ranked choice (the type of person - Assistant - that provides the products) was deemed too complicated to properly describe and difficult for policy setting because different women considered different characteristics important to them[32]. Moreover, when directly asked whether or not the type of assistant would deter them from collecting the product, most women said 'no'. The third most important attribute was the collection method, in a tie with supply reliability. We chose the former as it would provide practical policy lessons, and was fairly easy to conceptualise and put into a picture representing its attributes. Promotional messages had been set as one of the attributes because of the study objectives.

Levels for the physical attributes were determined based on the literature and consultation with key experts in the technologies. Willingness to pay values from the priority setting interviews guided the price attribute. Attribute levels for the distribution channel were chosen with women's rankings in mind, and considering their likely distribution sources. Collection method attributes were theoretically feasible collection methods, while promotion was more guided by expert opinion on the likely range of promotional messaging. The final attributes and levels for the DCE are shown in Box 8-1.

[32] This could be a full DCE study in itself.

Box 8-1 Summary of attributes and levels

Physical Attributes	**Levels**
1. Product: Female condom, diaphragm, microbicides, Neither (None, Male condom)	3+1
2. HIV preventive effect: 35%, 55%, 75%, 95%.	4
3. Pregnancy protection: 0%, 55%, 75%, 95%.	4
4. Able to use without partner knowing: Yes /No	2
5. Price single use, reusable: Free, low (R5, R20), medium (R10, R40), high (R20, R80)	4
Distribution Attributes	
1. Distribution outlet types: clinic, pharmacy, super market, corner store	4
2. Collection method: from a box or dispensing machine, from a person behind a counter, from a shelf, from a person in a private room	4
3. Promotional messages: HIV prevention, pregnancy prevention, more pleasure, women's empowerment	4
4. Price single use: Free, low (R5), medium (R10), high (R20)	4

The physical attributes DCE did not allow for all permutations and had an opt-out alternative. In the physical attributes DCE women had three options. They could choose between two barrier methods with their accompanying attributes, or select 'Neither, I would do what I did last time I had sex'. The 'Neither' option card had two sides, each representing the attribute levels of either having used a condom or not, depending on their previous response to that question; so 'male condom' is associated with 95% protection against HIV and pregnancy, it cannot be used in secret and is available for free. The 'no barrier method' side was characterised by: 0% protection against HIV, 0% protection against pregnancy, could be used in secret and is free (Table 8-1). The pictorial presentation can be seen in Box 8-7.

Table 8-1 DCE physical attributes and levels

Alternative	A,B	C Neither, I would do what I did the last time I had sex*	
Attribute	**Levels**		
Product	Microbicide (MCD), Diaphragm (DGM), Female Condom (FC)	Male Condom(MC)	No barrier method (None)
Effectiveness in preventing HIV			
(MCD, DGM)	35%, 55%, 75%, 95%	95%	0%
(FC)	75%, 95%		
Effectiveness in preventing pregnancy			
(MCD)	0%, 55%, 75%, 95%	95%	0%
(DGM ,FC)	75%, 95%		
Ability to use without partner's knowledge			
(MCD, DGM)	Cannot be used in secret, Can be used in secret	Cannot be used in secret	Can be used in secret
(FC)	Cannot be used in secret		
Price in Rand			
Single use product (MCD, FC)	Free, 5, 10, 20	Free	Free
Reuseable product (DGM)	Free, 20, 40, 80	Free	Free

MCD: microbicide; DGM: Diaphragm; FC: Female condom; *Depending on what they did the last time they had sex, a card was placed over the attributes with the appropriate attribute levels for either using a male condom with its attributes, or not using a barrier method.

Further details of the DCE procedures and presentation are presented below.

8.3.2. Generation of choice sets

Construction of efficient choice sets for DCE is the topic of a full research area in mathematics (see Chapter 4). The final design was a compromise between a behavioural model of choice, emphasising realism of choice sets and alternatives, and the statistical models.

The smallest orthogonal design was 120 for the physical attributes and 60 for the distribution attributes, which generated 180 choice sets in total. This was obtained using the ORTHOPLAN procedure in SPSS, which was recommended at the time the survey was designed (SAS is currently considered to produce better and more transparent designs). Conventionally DCE's choice sets are created in a two step process, with first the profiles generated using a computer package or an existing orthogonal design, secondly the alternatives (choices) are generated. The alternatives can be obtained by systematically changing the profiles. Most common methods are a randomly pairing another set of the profiles and using a fold-over where the levels are replace by their opposite values (e.g. 1

for -1 in a 2 level attribute) [439]. As this researcher was finding the creation of alternatives from profiles challenging based on the literature available at that time, a ten attribute profile was generated in SPSS with a separate attribute for each alternative. Practically this generated choice sets rather than the profiles it is intended to create, and so is is likely to have resulted in the loss of orthogonality.

Restricting the choice set alternatives to realistic combinations meant that certain attribute levels for the female condom and the diaphragm were limited. Female condoms could offer 75% and 95% HIV and pregnancy prevention, and could never be used without the partner knowing. The diaphragm could not be 0% effective against pregnancy. For the female condom, HIV prevention was re-coded from 35% to 75%, and 55% was changed to 95%. For pregnancy prevention 0% was re-coded to 75% and 55% to 95%. For the 'Ability to use without partner's knowledge' question, the 'No' was re-coded to 'Yes'. For the diaphragm, pregnancy prevention 0% was re-coded sequentially to 55%, 75% and 95%. For the distribution attributes, products cannot be collected from shelves in clinics. There were eight cases that were changed sequentially into box, person behind counter, and private room. Duplicate scenarios were removed. These changes led to an additional loss of orthogonality.

8.3.3. Assessment of design efficiency

The Huber and Zwerina criteria of orthogonality, level balance, utility balance and minimum overlap can be helpful in assessing the efficiency of the design. Orthogonality of the applied design was tested using the Street and Burgess website [439]. This showed a d-efficiency of 0%, i.e. the design has lost orthogonality, which is likely to result in challenges estimating the model parameters.

Level balance means that each level appears an equal number of times. Frequencies of the presence of the different levels were counted in SPSS. In repeated generation of designs in SPSS one of the products was always present in double the instances as the other two products. It was not clear why this was happening. Because both the diaphragm and female condom had restrictions on their feasible pregnancy and/ or HIV effectiveness, and for the purposes of this experiment microbicides did not, it was chosen to allow microbicides to be the 'over-represented' level. However, it is known that this will artificially inflate preferences for that level. The remaining attributes were revised to account for realistic ranges and thus led to unbalancing of the design (see above comments on the process of revising the design for realism). No changes were made to price, or the distribution

attributes. These were quite balanced. The largest divergence from equal proportions among the distribution attributes occurred in "person behind the counter" and "shelf levels" (Table 8-2).

Utility balance aims to generate choice sets that are difficult to choose between, thereby forcing the participant to make close choices. This allows for more precise parameter estimates [380]. However, this requires a priori knowledge of relative utilities. This can be considered using adaptive conjoint analysis or another computer based DCE elicitation procedure, but not in a paper-based procedure such as this one. For this reason this was not assessed.

Table 8-2 Assessment of level balance: frequency of each level in the DCE design

Attribute	Levels	Alternative A		Alternative B	
		Frequency	Percent	Frequency	Percent
Product	Microbicide	61	50.8	60	50.0
	Diaphragm	30	25.0	31	25.8
	Female Condom	29	24.2	29	24.2
	Total	120	100.0	120	100.0
Can be used without partner knowing	No	72	60.0	72	60.0
	Yes	48	40.0	48	40.0
	Total	120	100.0	120	100.0
Pregnancy risk reduction	Does not prevent pregnancy	14	11.7	14	11.7
	55%	26	21.7	25	20.8
	75%	38	31.7	42	35.0
	95%	42	35.0	39	32.5
	Total	120	100.0	120	100.0
HIV risk reduction	35%	21	17.5	21	17.5
	55%	23	19.2	24	20.0
	75%	37	30.8	36	30.0
	95%	39	32.5	39	32.5
	Total	120	100.0	120	100.0
Price	Free	43	23.9	44	24.4
	low	47	26.1	47	26.1
	medium	44	24.4	44	24.4
	high	46	25.6	45	25.0
	Total	180	100.0	180	100.0
Distribution channel	clinic	13	21.7	14	23.3
	pharmacy	15	25.0	14	23.3
	spaza shop	16	26.7	16	26.7
	supermarket	16	26.7	16	26.7
	Total	60	100.0	60	100.0
Collection method	box/machine	15	25.0	14	23.3
	person behind counter	17	28.3	18	30.0
	private room	16	26.7	17	28.3
	shelf	12	20.0	11	18.3
	Total	60	100.0	60	100.0
Message on package	HIV prevention	14	23.3	14	23.3
	pregnancy prevention	16	26.7	16	26.7
	more pleasure	15	25.0	16	26.7
	women's empowerment	15	25.0	14	23.3
	Total	60	100.0	60	100.0

Minimal overlap means having as few as possible attributes with the same level across the alternatives. The number of potentially overlapping levels in each scenario is equal to the number of attributes included, i.e. five for the physical attributes experiment and four for the distribution attributes. This is summarised by DCE in Table 8-3, with each scenario in the product attributes DCE having potentially five overlapping attribute levels and each scenario in the distribution scenario having four potentially overlapping attribute levels. Twenty-four percent of all scenarios (=43/180) had no overlapping attribute levels, 39% had one overlapping level, and 20% shared two attribute levels, 11% had three overlapping attribute levels, and 6 % (all in the product attributes DCE) had four overlapping levels.

Table 8-3 Assessment of level overlap.

Count of overlapping levels per scenario	Product (5 attributes)	Distribution (4 attributes)	Total	Percent of total
0	21	22	43	24%
1	42	28	70	39%
2	28	8	36	20%
3	18	2	20	11%
4	11	0	11	6%
Total	120	60	180	100%

Because the evaluation of these efficiency criteria are not routinely reported in the literature it is not possible to assess the acceptability of the amount of unbalance in the attribute levels and the extent of the overlapping levels. However, it may be that more frequently appearing levels (such as microbicides) may receive higher values due to the attention that is drawn to the attribute during the survey ([378, 379] in [273]). This will receive further consideration in the analysis.

8.4. The community survey sample

8.4.1. Sample size

The literature suggests the need for at least 50 responses to each alternative and 100 respondents per segment, and argues that the marginal benefit of additional respondents declines thereafter [440]. Segments (stratifications) of interest are: socio-economic status (SES) (low/middle), use of condom in last sex act (yes/no), and partner type (cohabitating with last sexual partner/ not cohabitating with last sexual partner). The categories are not mutually exclusive but each contain two mutually exclusive segments. Because the sample

sizes used in empirical studies vary so widely, we decided on a sample of 1000 to allow for any contingency and this would generate 3000 observations for the smaller (distribution attributes) choice experiment and 6000 for the larger experiment (physical attributes) and provide sufficient degrees of freedom to explore preferences within the strata of interest.

To obtain 1000 completed interviews from eligible women, the number of selected households needed to be increased in order to account for: households without adult women, failure to find the selected women at home, unwillingness of women to participate, and women who were not sexually active. Every household was estimated to have at least one woman aged 18-45. Initially, the number of households sampled was equal to the number of women needed. However, in the Nelson Mandela study only 74% of the 94% of selected individuals agreed to be interviewed [31 L]. This meant that the number of households/women selected in the randomisation needed to be increased by approximately a factor of 1.45. The Nelson Mandela study showed that 23.1% of women, who had had at least one partner in their lifetime, had not had sexual intercourse in the past 12 months. As the survey sought sexually active women, the sample was again increased by 25%. These figures led to a total target sample size of 1,812 adult women (desired sample 1000 x 1.45 (non-response) x 1.25 (not sexually active). However, the survey team estimated that 20% over-sampling would suffice. The randomisation strategy described below allows for flexibility in the sampling procedure to allow for this uncertainty. Chapter 8 presents the final sample realised.

Reasons for the necessity of stratified sampling: As mentioned above, the aim was to be able to analyse the data by socio-economic status (SES), by condom use, and by partner type. The geographical area chosen was a fairly typical township, with a wide range of housing types. A random sample in the selected communities was expected to capture the diversity of SES present in townships[33]. However, there were concerns whether a random sample would provide sufficient women who had used a condom in their last sex act and had had a range of partner types. The Nelson Mandela Survey (2002) found that 24.7% of females reported using a condom in their last sex act, while studies done in 1998 and 2000 showed that only 10%-12% of women used condoms in their last sex act [31 L, 99, 182]. The pilot data was examined and found that 31% of women reported using a condom during their last sex act. If condom use in our sample had been closer to the lower range found in the literature, then stratified sampling would have been needed to ensure sufficient numbers to do a sub-analysis of condom-use for the last sex act. However, partner-type appeared

[33] Our sample is representative of urban townships, not of South Africa as a whole.

more problematic than expected, with only 1 of 77 women reporting a casual partner in their last sex act. It was decided that cohabitation was a more helpful categorisation of partners. Since 56% lived with their last sexual partner, this categorisation was thus expected to provide sufficiently sized segments. Conceptually, this also categorises partner-types into relatively discrete groups rather than the more nuanced and subjective distinction of long term versus casual partnerships.

8.4.2. Sampling strategy and realisation

Sample randomisation was done at three levels: geographical area, household selection, and participant selection. In South Africa, towns are divided into enumeration areas (EA) consisting of approximately 100 households. Spruitview contained 18 EA, Zonkiziswe 61 EA, and Vosloorus 225 EA. These 304 EA were given random numbers, and then ordered by that number. A self-weighting random sample of 82 clusters was selected, of which 17 were in Zonkiziswe, five in Spruitview, and 60 in Vosloorus. It was thought that 50 would be needed to achieve 1000 interviews. The aim was to complete 20 interviews in each cluster. It was estimated that an additional 20% would need to be approached to realise this, therefore between 17 and 40 households were selected per cluster.

Household randomisation: Most EAs had well designated stand numbers, though some of the informal settlements did not. Aerial photos of the EA showed that the stands were plotted on street maps. A count of the number of stands per EA gave the sampling interval, ranging from every 4^{th} to every 9^{th} stand. The supervisors identified the stands. The first house to be counted was determined by a random start. If there were multiple households on a stand, a fieldworker used a random number chart to determine which household to approach.

Participant randomisation: The fieldworker conducted a random selection of eligible participants within a household at the time of first contact with the household. Interviewers would first identify themselves and introduce the study briefly; then request permission to note down all adult women living in the house in the order of their age. If their ages were not between 18 and 45 years they were removed. If more than one eligible woman lived in the household, a random number grid was used to identify which woman to select for participation. The fieldworkers had date-specific grids containing ten random numbers between 1 and 10, generated by the random number procedure in Excel. Once a number had been used, it was crossed off and the next number was used if needed. If the woman was not present the interviewer would ask for a good time to return. The interviewer would

return up to three times, and if the woman was still unavailable, a replacement would not be selected within the household.

8.4.3. Sample realisation

The sample realisation rate was lower than expected. Of the selected EAs, one was an empty field and four were men's hostels[34]. These were removed and replaced by the next five on the list. Once in the field it was found that one EA overlapped substantially with the pilot EA; it was therefore replaced. Two EA contained two houses from the pilot EA, so they were excluded from the household randomisation. Table 8-4 shows the sample realisation by cluster and the reasons that selected households did not contribute towards the sample. The realisation rate was on average only 12.4 per cluster, ranging from 6 to 22.

The main reason for the lower realisation was the number of households that did not have any eligible women (20%). As we do not have data with which to compare this rate over time or by location, it is not clear if this is abnormally high. However, national mortality data do show a reversal in the adult mortality rates between men and women in the age groups 20-34 years old[441]. In 1997 the excess mortality in males was 1.55 times that of women, while in 2003 it had dropped to 0.83 times the female mortality rate[441]. This is quite a dramatic reversal of excess death rates. This suggests death could be the cause of the absence of women in some of the sampled households.

[34] Male hostels did not meet the inclusion criteria as they officially do not house women.

Table 8-4 Distribution of households, clusters, and interview outcomes by location

	Zonkiziswe		Spruitview		Vosloorus		Total	
Clusters selected	17		5		60		82	
Households selected	429		108		1472		2026	
Complete	230	53%	45	43%	742	50%	1017	51%
Male only household	54	13%	3	3%	118	8%	175	9%
No eligible women	75	17%	20	19%	316	21%	411	20%
Not at home	37	9%	17	16%	155	10%	209	10%
Postponed	6	1%	7	7%	40	3%	53	3%
Refused	7	2%	9	9%	52	3%	68	3%
Partially completed	1	0%	1	1%	7	0%	9	0%
Other	6	1%	4	4%	27	2%	37	2%
Missing reason	13	3%	2	2%	15	1%	30	1%
Incorrect sampling	2	<1%	0	<1%	15	1%	17	1%
Total households	431	100%	108	100%	1487	100%	2026	100%
Average number of completed interviews per cluster	13.5		9.0		12.4		12.4	

The total number of completed interviews was 1017. An additional 17 questionnaires were completed but have not been included in the analysis as the participants were incorrectly interviewed, either because they did not fulfil the inclusion criteria or the randomisation of the household or woman was incorrect. All questionnaires completed by one interviewer were also removed (approximately 40), due to suspicion of consistently fraudulently completing the DCE section, which was the last and most challenging section of the questionnaire. This interviewer was primarily based in Vosloorus, and had conducted most of the interviews that were not in Sotho or Zulu as she was one of the few interviewers who mastered other languages.

8.5. Final instrument

8.5.1. Overview

The final community survey questionnaire consisted of four sections (Appendix 6.1). The first collected background data on the respondent, including indicators of socio-economic status (education level, type of housing, and an asset index). The second section collected reproductive histories, including experience with existing barrier methods: what they use,

where they obtained it, if they had or had not used a condom in their last sex act. This describes the 'neither' option. The reproductive histories also included information about contraceptives, life-stage questions (current type(s) of sexual partnership(s) and desire for pregnancy), and the respondent's perceived HIV risk. The method that was used last time reveals preferences for (and/or ability to use) condoms, the existing methods. The third section presented an introduction to barrier methods, and elicited preferences of products using both contingent valuation and a DCE; this section is described in more detail below. A male condom, female condom, a diaphragm, and a microbicide applicator filled with lubricant were provided for respondents to inspect as they wish, and ask questions. This was included to reduce the hypothetical nature of the products. The last section consisted of questions evaluating the interview and eliciting participant feedback on the questionnaire.

The questionnaire was translated into the two most common non-English languages in the recruitment areas (Sesotho and isiZulu); then translated back for validation.

8.5.2. The description of products and elicitation format for direct WTP.

Women were given a description of the different barrier methods: male condoms, female condoms, the diaphragm and microbicide (Box 8-2). During this description they were handed the products (a prototype applicator filled with lubricant representing a microbicide). This was followed by an open-ended willingness to pay question on each of the products.

Box 8-2 Presentation of each barrier method to participants

SECTION 3: STATED PREFERENCES & INTRODUCTION TO FEMALE BARRIER METHODS

We are going to discuss existing barrier methods for HIV prevention: male condoms, female condoms and some that are being developed: microbicides and the diaphragm. I am sure you are all familiar with male condoms. They are very effective in preventing HIV infection and pregnancy. They are put on right before sexual intercourse, and cannot be used without a male partner's knowledge and participation. We will now tell you a bit more about the other products.

Firstly the female condom: HAND TO PARTICIPANT. The female condom is available in some clinics and shops. It provides good protection against HIV, STI and pregnancy. It can be put in for up to 6 hours before sex, and can be kept in for a total of 6 hours. It is recommended that a new female condom is used for each round of sex, however the female condom is strong and can in some cases be reused if no new one is available, and there is no male condom or your partner does not wish to use a male condom. If the female condom is re-used, it needs to be washed carefully with soap and water and patted dry between each use. It should not be used more than 7 times. The outer ring can sometimes slip inside the vagina, and some people say they can hear the female condom move while they have sex. The female condom can be used at the same time as using injectable contraceptives or the pill.

The Diaphragm, HAND TO PARTICIPANT, is a method that has long been used for pregnancy prevention and has shown to prevent some STIs. It is currently being tested to see if it provides any protection against HIV infection. The diaphragm can be kept in the vagina for up to 24 hours at a time, so can be inserted anytime before sex. It must be left in place for at least 6 hours after sex. The diaphragm you see here needs to be fitted by a health worker for the correct size and can be used for up to 2 years if cared for properly. This means that care is taken when removing it, not to pierce it with a long fingernail, and to wash it with soap and water and store it in its box. Using a lubricant makes the diaphragm easier to insert. If lubricant is not available, wetting the diaphragm with a little water can help slide the diaphragm into the vagina. Some partners can feel the diaphragm during sex, while others cannot feel it. Scientists are developing a single use disposable diaphragm and a one-size fits all diaphragm. The diaphragm can be used at the same time as using injectable contraceptives, the pill, and/or condoms.

Microbicides, HAND APPLICATOR TO PARTICIPANT, are new products that are being tested to see if they can reduce women's risk of becoming HIV positive. Microbicides are also being tested to see if they can prevent some STI. These products are still being tested, it is not yet known if they provide any protection against HIV or whether they may reduce a woman's chance of becoming pregnant. If an effective microbicide is found, they may either come in a pre-filled applicator that will need to be thrown away after each use, or may be developed for use with a re-usable applicator with a tube of microbicide. The re-usable applicator will need to be washed after each use and refilled before each use. It is also not known if they need to be inserted directly before sex or if it can be inserted a few hours in advance. The gel may make the vagina a little bit more moist (wet). Some partners may notice this, while others may not. Microbicides can be used at the same time as using injectable contraceptives, the pill, and/or condoms.

We would like to remind you that right now we do not know if the diaphragm and microbicides provide any protection against HIV. Only male and female condoms have been shown to prevent HIV infection.

In the open-ended willingness to pay question, female condoms were presented as equally effective as male condoms at preventing HIV and the diaphragm and microbicides as half as effective as condoms. Women were first asked about their willingness to try the newer methods, and if they thought each was something they would want and be able to use regularly, then the willingness to pay question was posed. Then women were presented with the DCE.

8.5.3. Participant familiarisation with attributes and level

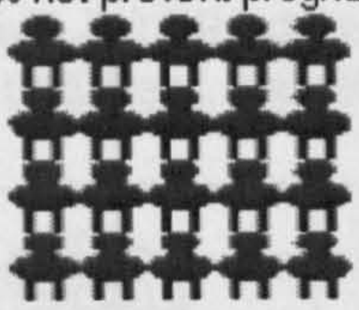
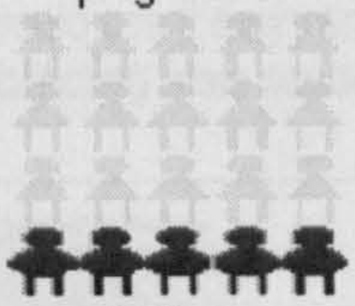
To prepare women for the presentation of the attributes and their ranges women were first presented with each attribute individually and asked to choose their preferred level. After presenting the pictures of the products, women were shown the pregnancy prevention and HIV prevention attributes (Box 8-3), then secrecy (Box 8-4) and price (Box 8-5). The physical attributes DCE was then done. Then the attributes and levels for the distribution DCE were presented one-by-one (Box 8-6) and the DCE implemented. The implementation is presented in the next secion.

To prepare women for HIV and pregnancy prevention attributes portraying partial effectiveness, women were presented with visual depictions of choices on what level of

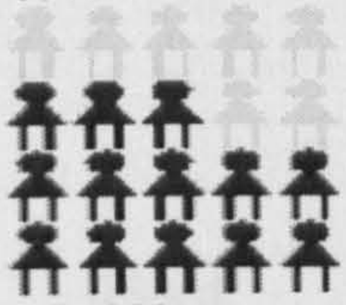
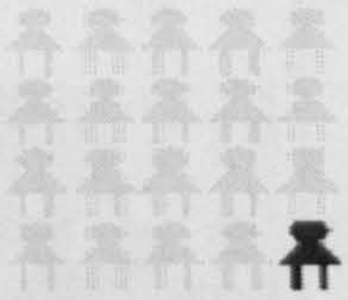
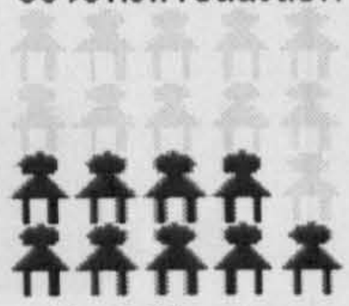
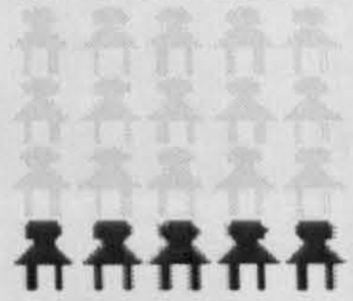
HIV prevention they need, and what level of pregnancy prevention they want from their HIV prevention product (Box 8-3)[35]. These questions also help us to have a sense of how well women did comprehend the pictures. Understanding was high, with 94% of women choosing the highest level of HIV prevention presented. These were deliberately in mixed order: 35%, 95%, 55%, and 75% for male condom, and 55%, 0%, 95%, 75% for the female condom, to ensure respondents actually looked at the values before responding. 83.7% chose the highest level of pregnancy prevention, and 4% chose no pregnancy prevention.

Box 8-3 Presentation of each pregnancy and HIV effectiveness to participants

What kind of pregnancy prevention do you want from your HIV prevention product?

55% reduction in pregnancies	Does not prevent pregnancy	95% reduction in pregnancies	75% reduction in pregnancies
			
9 of 20 women become pregnant	All 20 women become pregnant	1 of 20 women become pregnant	5 of 20 women become pregnant
1	2	3	4

Do you need a product that provides low (POINT TO 1) protection against HIV, very high (POINT TO 2) protection, medium protection (POINT TO 3), or high protection (POINT TO 4) against HIV?

35% risk reduction	95% risk reduction	55% risk reduction	75% risk reduction
			
7 of 20 women remain HIV negative	19 of 20 women remain HIV negative	11 of 20 women remain HIV negative	15 of 20 women remain HIV negative
1	2	3	4

Box 8-4 Is it important to be able to use a product in secrecy? That means without your partner knowing.

✓	X
Yes, Can be used without your partner knowing	No, Cannot be used without your partner knowing

[35] Please also note that these are the final formats of the risk reduction attribute levels. It can be seen that these were simplified from Box 7-1where the figures have faces and are outlined.

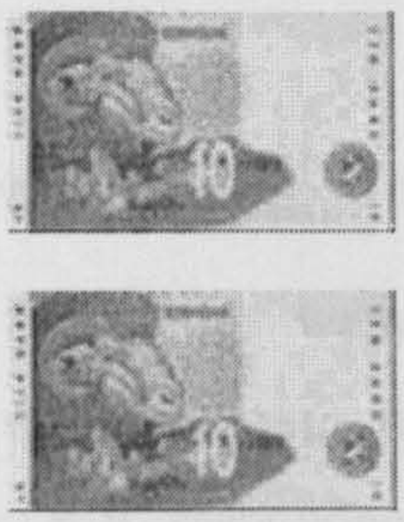
The price of a microbicide or a disposable diaphragm is likely to be within the current price range of male and female condoms: free at the lowest price and R22.50 at the top end[36]. Women were asked "What is the highest amount you would be willing to pay and could afford to pay for any of these single use products to use it every time you have sex?" (Box 8-5). When presented with the four prices (R0, R5, R10, R20). To represent the price of a reusable product (i.e. that is only the diaphragm) women were presented with a higher set of prices (R0, R20, R40, R80).

Box 8-5 Payment scale willingness to pay questions for a single use product and a reusable product.

What is the highest amount you would be willing to pay and could afford to pay for any of these **single use** products to use it every time you have sex? Is it 0 Rand, I would only use it if it were free? Or I would use it every time I had sex if it were 5 Rand, 10 Rand, or 20 Rand. You still have the existing other options of collecting male condoms for free or paying for them.

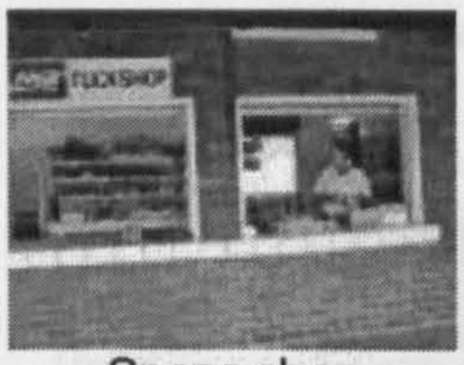
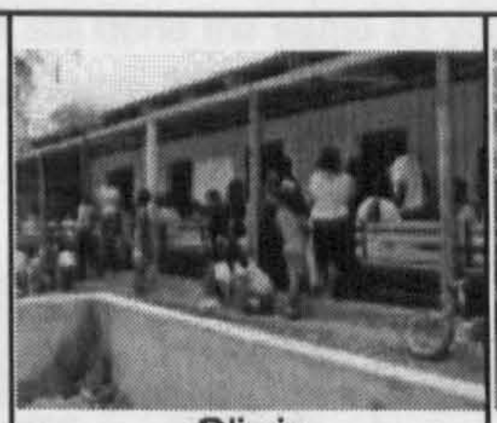
0 Rand, I would only use them if they were free	 5 Rand	 10 Rand	 20 Rand
1	2	3	4

What is the highest amount you would be willing and able to pay for any of these **Reusable** products?

0 Rand, I would only use them if they were free	 20 Rand	 40 Rand	 80 Rand
1	2	3	4

[36] This was the price for two V-Amour female condoms in the private sector, female condoms from the Female Health Company were not readily available in the private sector.

Box 8-6 DCE distribution attributes and levels and their presentation

Distribution channel			
 Spaza shop	 Clinic	 Supermarket	 Chemist
Collection method			
 From a shelf	 From a person behind a counter	 In a private room	 From a dispensing machine or box
Message on package			
 Women's Empowerment	 Pregnancy Prevention	 Extra Pleasure	 HIV Prevention

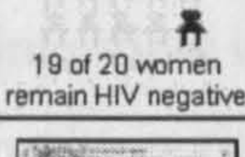
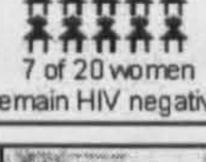
8.5.4. DCE presentation

The DCE section included a warm-up question to help the respondent understand the concept of DCE questions and trade-offs between the attribute levels. During the introduction to the DCE, respondents were asked to keep their last sex act in mind when making choices between the alternatives. This was supported in the physical attribute DCE by a card that was placed over the opt-out option showing on one side the attribute levels of having used a male condom and on the other side the attribute levels of not having used a male condom (Box 8-7). This aimed to capture not ideal usage but feasible usage.

Box 8-7 Presentation of the physical choice sets

Here are the products and this is what they do: Would you have used either of these products in your last sex act or would you have still done the same as you did the last time you had sex?

VERSION: A

CHOICE Attribute	A	B	C
Izinto Hlahiso Product	 Female condom	 Microbicide	**Ngeke ngiguquke kulokhu bengikwenzile esikhathini esedlule** **Leletho nka se fetole seo ke se entseng kgetlo le fetileng** Neither, I would not change what I did last time
Ngasese Sephiring Secrecy	 No, Cannot be used without your partner knowing	 Yes, Can be used without your partner knowing	
Ukwehlisa amathuba okukhulelwa Ho fokotsa menyetla ya ho ima Pregnancy risk reduction	95% reduction in pregnancies  1 of 20 women becomes pregnant	95% reduction in pregnancies  1 of 20 women becomes pregnant	
Ukwehlisa amathuba okusuleleka nge HIV Ho fokotsa menyetla ya ho tshwaetswa ke HIV HIV risk reduction	95% risk reduction 19 of 20 women remain HIV negative	35% risk reduction  7 of 20 women remain HIV negative	
Intengo Hlwahlwa Price	 20 Rand	 20 Rand	
CHOICE	1	2	3

ID 1

Neither option card

Front	Back
Flesh to Flesh Use no barrier method	 Male Condom
 Yes, Can be used without your partner knowing	 No, Cannot be used without your partner knowing
Does not prevent pregnancy  All 20 women become pregnant	95% reduction in pregnancies  1 of 20 women become pregnant
0 risk reduction  0 f 20 women remain HIV negative	95% risk reduction  19 of 20 women remain HIV negative
Free 0 Rand	**Free** 0 Rand
3	3

The distribution attributes experiment was simpler in design. Women were asked their preferred barrier method, if not for current use, for possible use in the future. Based on that preferred product, they then made a choice between two distribution scenarios, thus providing conditional demands. The attributes for the distribution DCE were: distribution channel, collection method, advertising message and price. The levels for these attributes and how they were represented can be found Box 8-6.

8.5.5. Axiom testing

It is good practice in DCE to test the extent to which the respondents' answers are consistent with fundamental axioms in economics[442, 303, 443, 413, 394, 444, 445, 407, 446, 403, 415, 29, 447-450]. To test for stability, the same choice set was included at the beginning and at the end of the DCE. A hold-out question was included in the questionnaire, but not in the estimation procedure to test for predictive/internal validity. Validity was tested using a dominant-pair test (monotonicity). Unwillingness to trade was tested, including a second dominant-pair test in favour of a different alternative. Given the high quantity of condom promotion messages stating that one 'should' always use condoms, there was some concern around

over-reporting of condom-use during the last sex act. This reporting bias was explored by including scenarios comparing existing options and checking for consistency between their choice and their reported practice during the last sex act. In order to avoid overloading the questionnaire, each of these tests were only included in 20% of the questionnaires, so each questionnaire included one extra question. Appendix 7 shows the final design and the blocking of the scenarios into choice sets.

Ten choice sets were considered a cognitively reasonable exercise to present to respondents. [373]. The 180 experimental choice sets plus 20 test choice sets were blocked into 20 questionnaire versions. The axiom tests were added on as the last choice task within the distributional DCE's, with the exception the reporting-bias choice, which was in the physical attributes format.

8.5.6. Evaluation questions

After the main interview was completed, participants were asked some additional questions about their experiences responding to the questions in the interview, such as which questions were difficult, uncomfortable, etc. There was also a short section for the interviewer to complete about how the interview had gone that covered interruptions, attendance by others, whether the women had difficulty answering questions, and provided space for other comments.

This completes the overview of the survey instrument. The next section covers practical issues related to implementing the survey.

8.6. Community survey procedures

8.6.1. Recruitment and training of interviewers

From within the study communities 20 adult women of different ages were recruited to implement the survey. Women participated in a week long training in interview methods and understanding of the questionnaire that ended with the implementation of the pilot survey. Part of this training focussed on how to correctly obtain an informed consent and how to maintain confidentiality. A week's break was taken to analyse the data and revise the questionnaire. Given the random selection procedure, age matching was not possible, but extremely young or old women were not recruited as interviewers. After this week, three did not return.

8.6.2. Field procedures

There were five teams of field workers implementing the survey, composed of four to five fieldworkers with a supervisor and a vehicle. Interviews were conducted with women in Ekurhuleni in their homes. The interviews were face-to-face, and a generic paper questionnaire was used. The DCE had 20 versions, which were kept in colour flipcharts. Every day the flipcharts were rotated among the fieldworkers following a fixed rotation scheme. During the interview the study was first explained, then informed consent requested. The questionnaire was administered in a private setting, emphasising that the questionnaire could not be completed in the presence of the partner. Participants were provided a token reimbursement in the form of a telephone card worth 20 Rand (1.71 in 2005 GBP), as is common practice with such surveys.

The interviewers had HIV information booklets containing contacts of available referral services to hand out to all participants who were willing to accept them. Debriefing and training sessions were held every day with the interview team to give them the opportunity to share field experiences in confidence and support any training needs identified.

The survey instrument and consent form appear in Appendix 6.1 and Appendix 6.2, respectively.

8.6.3. Quality control using evaluation interviews

A process evaluation was carried out to document the aim of assessing participants understanding of the products, particularly that microbicides and the diaphragm were still being tested and were not yet known to prevent HIV, and the DCE attributes and levels, particularly the understanding of the relative risk profiles.

A short additional questionnaire was administered after the survey questionnaire to 42 participants[37]. This additional questionnaire was administered by the researcher with the aid of a South African research assistant, who was involved in this study from the outset. The final evaluation survey instrument was a fairly quantitative checklist of a participant's understanding of the product attributes and the discrete choice experiment, however most evaluation interviews were also recorded as a fallback if needed. Approximately three participants were selected daily for this additional questionnaire. Identifying data were

[37] An additional ten participants completed this survey during the first three days; these were used to refine the tool and not considered as part of the evaluation survey.

collected to enable the evaluation interview to be linked with the valuation survey. After the teams had been in the field for about two hours, a team was chosen to visit. Supervisors were not told in advance which team would be visited. Participants that were re-interviewed were selected by randomising the fieldworkers who interviewed them. The monitors were approached to provide the most recently completed interview by a specific fieldworker. Sometimes, the fieldworkers themselves were asked to provide the addresses. The woman was approached and her participation requested for the brief additional questionnaire (Appendix 8). Though not the main aim, the evaluation survey was also a monitoring tool that helped to identify problems related to the survey implementation. Results from the evaluation survey also contributed to the interpretation and discussion of the DCE results but are not formally analysed within this thesis.

8.6.4. Problems encountered

Two fieldworkers were fired in two separate incidences of fraud. The first incident occurred 12 days into the survey, when a fieldworker was found making up answers to missed questions, rather than revisiting the interviewee. The second incident occurred during the last few days of the survey, when the evaluation survey detected that a fieldworker was administering all questions with the exception of the ten DCE scenarios. This was the only fieldworker who had not been evaluated earlier, therefore it could not be determined if she had been doing it from the start. Therefore all her previously completed questionnaires were shredded.

8.6.5. Data entry

All questionnaires were checked at least once by the field monitors, the survey monitor or myself. Missing responses and inconsistent answers were returned to the interviewee for completion/correction. Double data entry was employed: two people entered each questionnaire into the database, then the two versions were compared. Where differences were identified, the original paper survey was referred to and corrections made. During data cleaning there were further checks for infeasible responses and illogical inconsistencies. Descriptive statistics and data plots were used to identify outliers. These were checked against the paper surveys. During data entry and cleaning, the surveys were kept at the main offices of the survey group. They were then couriered to LSHTM, and will be destroyed after the end of the study.

8.7. Discussion

This chapter has summarised the design and issues arising in the community survey. To collect data on women's preferences for barrier methods and their distribution, a large (1017 participants) community survey was implemented in adjacent townships in South-East Johannesburg. The community survey instrument was developed based on a series of eight focus group discussions, six in-depth interviews, and an attribute identification workshop. Specific analysis methods are provided alongside the findings from the analysis of the community survey in the in next section.

SECTION III: SURVEY ANALYSIS AND INTERPRETATION

This section of the thesis consists of four chapters. Chapter 9 gives an overview of the survey realisation and explores the generalisability of the survey population to the broader urban South African female population. Chapter 10 explores women's socio-demographic characteristics to identify which might be most defining in terms of their preferences. It uses a market segmentation analysis and an analysis of women's willingness to pay (as a proxy for their preferences) to identify critical women's characteristics to include in the subsequent analysis of the discrete choice experiments. Chapters 11 and 12 present the analysis of the discrete choice experiments of product attributes and distribution and promotion strategies, respectively.

Chapter 9. Sample generalisability

9.1. Introduction

The previous chapter described the design and implementation of the household survey of adult sexually active women in Johannesburg, South Africa. This chapter aims to:

1. Review the household socio-economic characteristics of study participants using descriptive statistics,
2. Develop a household socio-economic status indicator from participants household characteristics using factor analysis.
3. Review women's own socio-demographic characteristics, including reproductive health histories.
4. Assess if the sample of women who participated in this study are representative of urban South African women from the general population and consider if results from this survey can be generalised to the broader urban female population in other locations.

In the following sections characteristics of the sampled households and women are explored using descriptive statistics. Household socio-economic status, women's socio-demographic and behavioural characteristics and reproductive health histories are examined. These are then compared with data from two nationally representative surveys [30, 31]. Section 9.2 provides the methods employed in this chapter. Section 9.3. gives an overview of the household characteristics using descriptive statistics. Section 9.4. presents the socio-economic indicator. Section 9.5. presents the demographic and reproductive behaviour characteristics of the women who participated in the survey. Section 9.6 briefly compares the three study locations in terms of the household characteristics and women's own socio-

demographic characteristics. Section 9.7 considers the validity of the survey sample. The validity of the DCE responses is reviewed in Section 9.8, and 9.9 concludes the chapter.

9.2. Methods

Two main methods were used to meet the objectives of this chapter:

- To understand the comparability between the women in our survey and urban South African women from the general population, a range of variables from this survey were compared with two recent nationally representative surveys.
- To represent the variation in household socioeconomic status an index were estimated using principal components analysis.

9.2.1. Review and comparison of descriptive statistics

A review of the household and individual characteristics of the study participant is undertaken using basic descriptive statistics. Generalisability was assessed by comparing women's socio-demographic characteristics with those from two recent nationally representative surveys in South Africa: the South Africa Demographic and Health Survey (DHS) from 2003 [30] and the South African National HIV Prevalence, HIV Incidence, Behavioural and Communication Survey, 2005 (known as the Nelson Mandela Survey (NMS)) [31]. This was a nationally representative survey which included questions on sexual behaviour comparable to those included in Ekurhuleni and the 2003 DHS mentioned earlier.

9.2.2. Estimation of a socio-economic status index

Principal components analysis was used to operationalise the concept of socio-economic status into a uni-dimensional quantitative variable. "PCA is a multivariate statistical technique used to reduce the number of variables in a data set into a smaller number of 'dimensions'." [451] as applied by Kline (2000) [452]; Vyas and Kumaranayake (2006) [451], and Filmer and Princhett (2001) [453]. For the indicator here, variables included were those thought to be important to the broader concept of SES. The proxy for wealth included is the ownership of ten assets (radio; television; telephone (landline or cell phone); refrigerator; computer; washing machine; bicycle; motorcycle; car; and sheep or cattle); if the household has electricity; lives in a shack or a room outside; or a self-owned brick house; and the number of people per room. Social capital was captured by the variables: number of years living in the location and the level of difficulty in accessing R100 if needed in a medical emergency[38]. The statistical technique then computes 'principal components' representing non-correlated dimensions or indices in the data. Values, representing importance weights,

are given to each of the variables. From the presence of the variables in women's homes an index is then calculated, representing the relative socio-economic status of each woman's household. Some studies proceed to recode this variable into categorical variables such as quintiles, or use cluster analysis to identify some natural clustering of the index [451]. As the continuous variable provides more information than such a categorical recoding of it, for the purpose of this thesis, the continuous form of the variable was used.

9.3. Survey household characteristics

The majority of women interviewed reported living in brick homes, either self-built or on a bond (mortgaged); 27% lived in municipal, RDP, or RDP extended[39] houses, 25% lived in a shack. Other types of housing include outside room, inside room and hostel accommodation. The houses ranged from one to 13 rooms, of which between one and seven were used for sleeping. Most common was a four room house with two bedrooms, and four inhabitants (ranging from 1 to 17). On average there were 2.26 people per bedroom, ranging from 0.5 to 10. Accommodation was mostly privately owned, either owned by partners (31%), parents (28%), or by the respondents themselves (23%).

Most homes were relatively well equipped. Table 9-1 shows the percentage of households who own each asset; the columns show the differences in asset ownership by the two most common and most distinct (from each other) types of housing: bond house and shack, and the total for all housing types (including those not shown). Women were asked both if they had each asset and if each asset was in working condition. If the asset was broken, the asset was treated as not being part of the woman's assets. Only 8% of homes did not have electricity, and most had a television, a phone and a fridge (85%, 87%, and 83%, respectively). About one-third of households had cars and/or washing machines; in households in a bond house this was 49%, and of households living in a shack this was 14%. Computers were quite rare with only 121 (12%) respondents living in a household with one; of these households with computers, six lived in shacks. On the extremes, there were 14 (1%) households who owned none of the assets, and 18 households who owned nine of the 11 assets on the list. No household had more than nine of these assets. Cattle, sheep, bicycles and motorcycles were quite rare in this area. Other indicator of socio-economic status is an individual's access to R100 for a family member's medical treatment. For 34% of respondents this would be quite difficult, and for 13% very easy.

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[38] It could be argued that these are either individual characteristics or household characteristics.
[39] These are the RDP houses which have been extended by residents to include extra rooms.

Table 9-1 Household asset ownership by housing type

Percentage in possession of:	Bond house	Shack	All Housing types[40]	DHS 2003-Urban
Electricity	99%	73%	92%	90%
A radio	94%	72%	84%	81%
A television	98%	64%	85%	79%
A telephone/cell phone	96%	70%	87%	70%
A refrigerator	98%	54%	83%	75%
A personal computer	22%	2%	12%	14%
A washing machine	58%	8%	37%	n/a
A bicycle	18%	11%	14%	16%
A motorcycle or motor scooter	0%	0%	1%	2%
A car	49%	14%	31%	33%
Sheep or cattle	1%	1%	1%	2%
Total number of households	381	256	1017	4502
(% of all households)	(37%)	(25%)	(100%)	

9.4. The household socio-economic status indicator

Now the household data has been explored, this can be used to constructs a variable of household socio-economic status, which then summarises a number of the dimensions of household characteristics above, into a uni-dimensional composite index. A review of the concept of socio-economic status and poverty can be found in Appendix 9. Following an overview of the method used to construct the household socio-economic status index, a description of the variable is briefly presented.

9.4.1. The results of composing a socio-economic status index

The PCA generated 16 components. The first represents the socio-economic status index of interest. The first component accounted for 25% of variation in the data. The component scores represent the weight of each variable in the index, shown in Table 9-2.

[40] This includes categories not shown' to the column heading 'All housing types

Table 9-2 Wealth and social capital proxy weights in socio-economic status indicator

Inputs	Factor score
Wealth indicators:	
Lives in a shack or a room outside	-0.71
Lives in a self owned brick home	0.63
Crowding index (people per sleeping room)	-0.39
Household ownership of:	
Electricity	0.59
A radio	0.51
A television	0.67
A telephone/cell phone	0.51
A refrigerator	0.68
A personal computer	0.39
A washing machine	0.58
A bicycle	0.21
A motorcycle or motor scooter	-0.00
A car	0.48
Sheep or cattle	0.01
Social capital indicators	
Years lived in location	0.27
Ease of access to R100	0.54

The absolute magnitude of these weights indicates the strength of association with being of higher or lower socio-economic status. This can also help to consider the theoretical validity of the index. It can be seen that the largest weight (in absolute size) is for the variable 'lives in a shack or room outside'. As it is negative, it indicates that it is a strong identifier for those of low socio-economic status. The second most important asset is refrigerator, followed by owning a television and living in a home owned by one of the occupants. A couple of variables contributed little to the index: owning sheep or cattle and a motorcycle. By definition, the mean of the index is 0, and a standard deviation of 1. However, the median of 0.22 shows the skewdness of the index. This can also be seen in Figure 9-1.

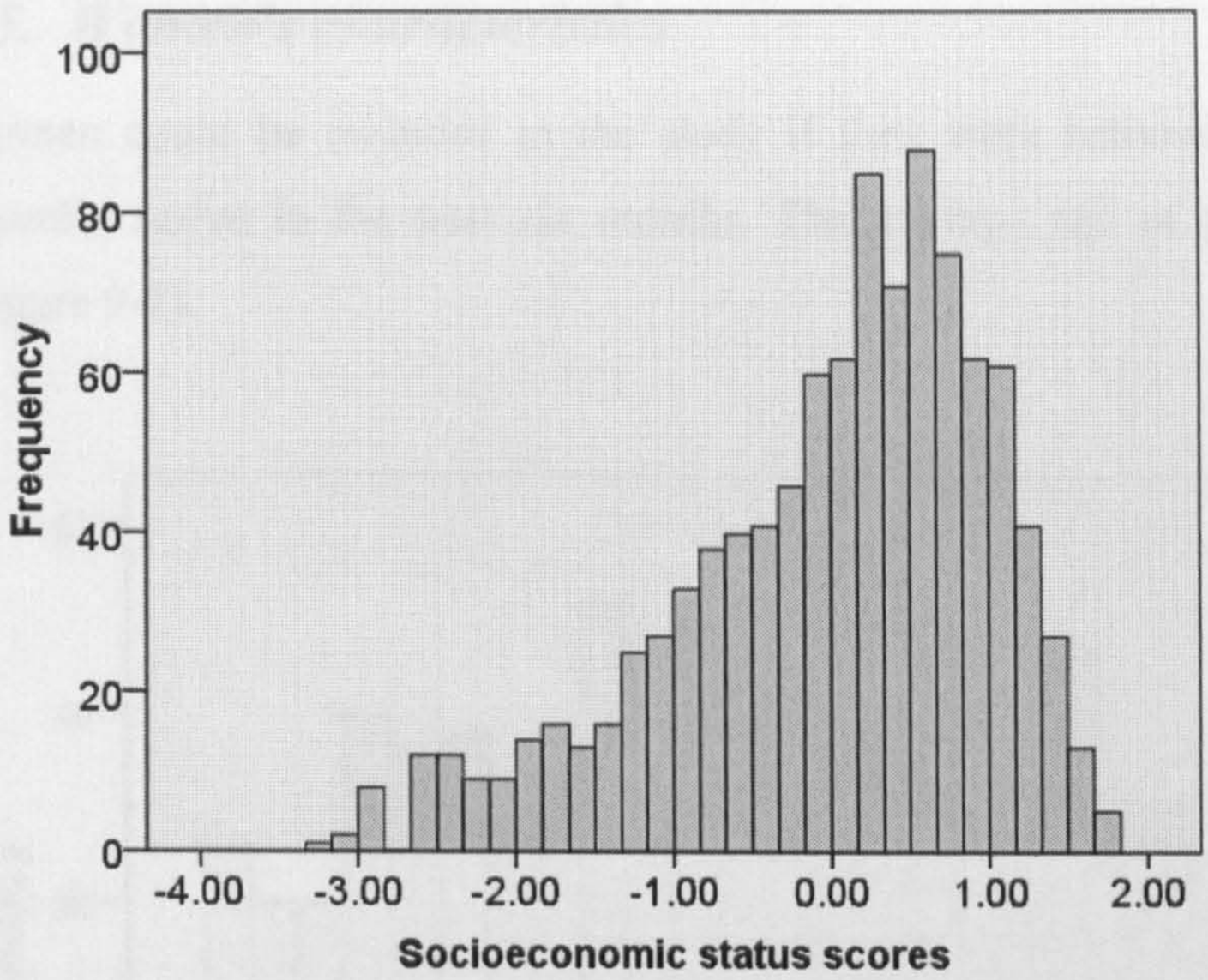


Figure 9-1 Distribution of socio-economic status variable

Using the "two-step cluster" procedure in SPSS, three clusters are identified. It would be expected that the lowest socio-economic status group would be represented more in households living in Zonkiziswe and that more of the households in Spruitview would be in the highest category.

Table 9-3 Descriptives of socio-economic clusters

Cluster	Average socio-economic status	Number of households in			
		Zonkiziswe	Vosloorus	Spruitview	Total
1	-1.72	86	88	0	174
2	-0.17	126	275	11	412
3	0.87	16	376	34	426
Total		228	739	45	1012

In Table 9-3 it can be seen that Cluster 1 has the lowest socio-economic status and cluster 3 the highest. Cluster 1 contains 38% of households from Zonkiziswe, 11% of households from Vosloorus and no households from Spruitview; cluster 3 on the contrary contains 7% of households from Zonkiziswe, 51% of households from Vosloorus and 76% of households from Spruitview. This is consistent with expectations.

9.5. *Women's characteristics*

Women could be included in the study if they were between 18 and 45 and had been sexually active in the past six months. The average age of participants was 31.5 years (Figure 9-2).

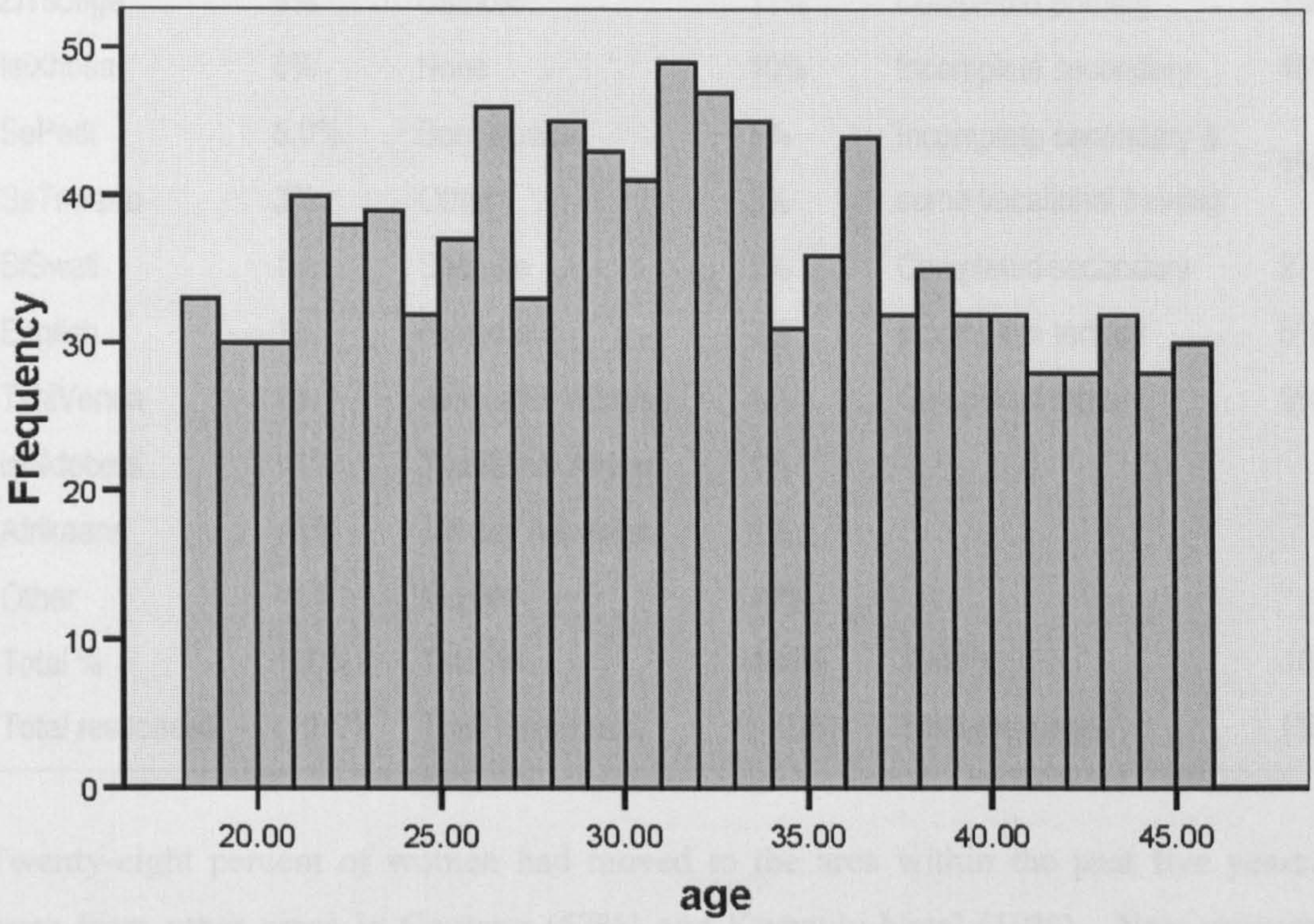


Figure 9-2 Age distribution of participants

The most common languages spoken in women's homes were Zulu (52%) and Sotho (24%). Few women (3%) women never had any formal schooling; 45% started but did not complete secondary school, and 27% completed secondary school; 9% completed tertiary education (Table 9-4).

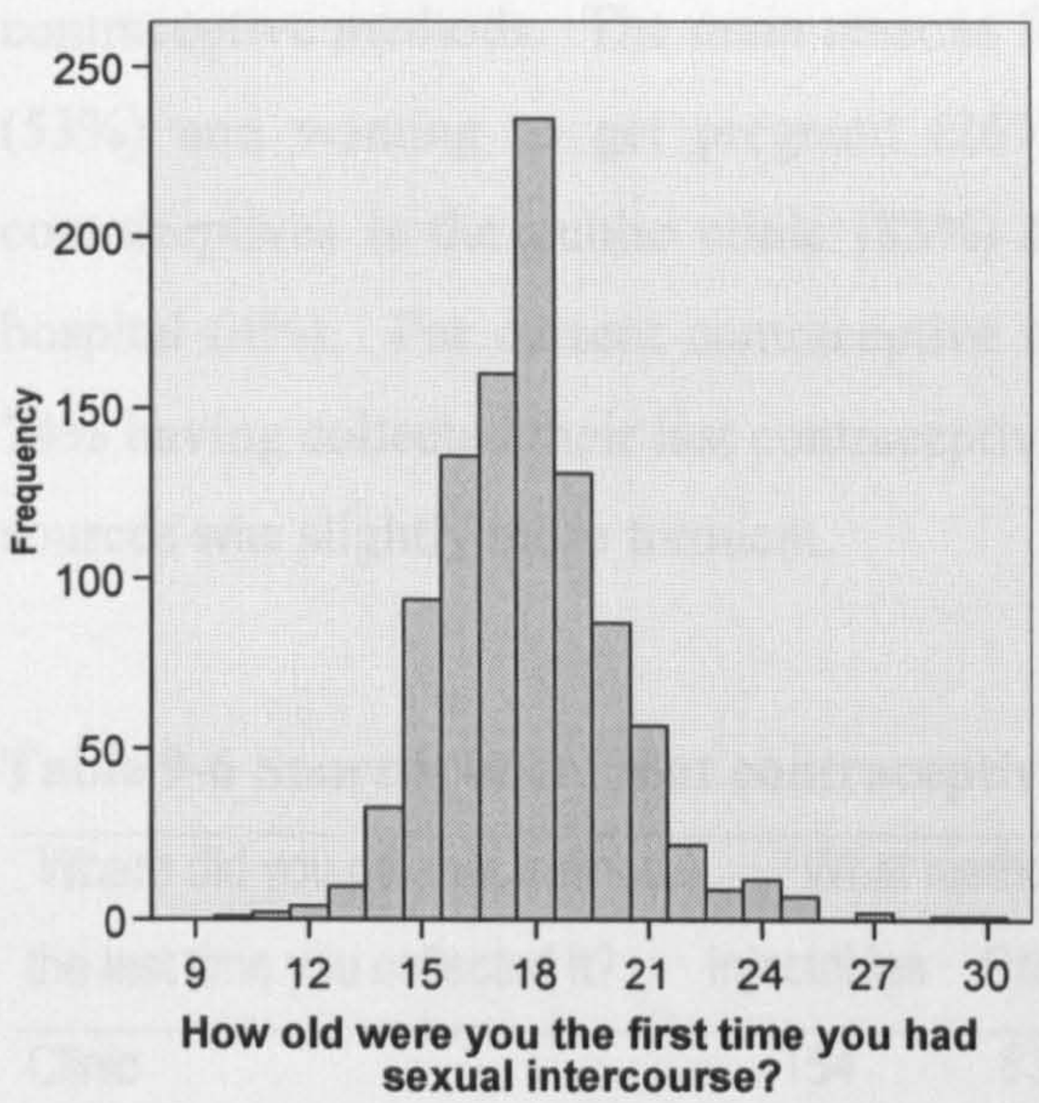
Table 9-4 Participants' languages, religions and educational attainments

Home language		What religion do you belong to?		What is the highest level of education you gained?	
IsiZulu	52%	Christian –unspecified	37%	None	3%
SeSotho	24%	Zionist	25%	Incomplete primary	6%
ZiTsonga	8%	Catholic	11%	Completed primary	3%
IsiXhosa	6%	None	10%	Incomplete secondary	45%
SePedi	5.0%	Born Again	8%	Incomplete secondary & some vocational training	1%
SeTswana	3%	Other	3%		
SiSwati	1%	Shembe	2%	Completed secondary	27%
English	1%	Protestant	2%	Incomplete tertiary	5%
TshiVenda	1%	Jehovah's Witness	1%	Completed tertiary	9%
isiNdebela	<1%	Traditional African	1%		
Afrikaans	<1%	7th day Adventist	1%		
Other	<1%	Muslim	<1%		
Total %	100%	Total %	100%	Total %	100%
Total responses	(1017)	Total responses	(1016)	Total responses	(1016)

Twenty-eight percent of women had moved to the area within the past five years. Most were from other areas in Gauteng (57%) and Kwazulu-Natal (19%). New movers came from other large cities (36%), towns (37%) and rural areas (27%). Just over half the women (51%) were unemployed, 26% worked full-time, and 10% part-time, the remaining were students (8%), housewives (5%), retired (<1%), and undefined (1%). The most common sectors of work were sales and services (72%) and domestic work (14%). 560 women (55%) were living with a sexual partner (of which 84% considered their partner as the head of household); 25% lived with their parents, and only 8% lived by themselves; about 77% of cohabitating women reported that their partners contributed more financially to the household then they did themselves.

Reproductive health histories

The median age at sexual debut was 18 years old, ranging from 10 to 30 years old. Women had an average of 1.8 children, with 80% having at least one child. About a quarter (24%) of women would be happy if they became pregnant in the next couple of weeks, 14% would be indifferent, and 63% would be unhappy.



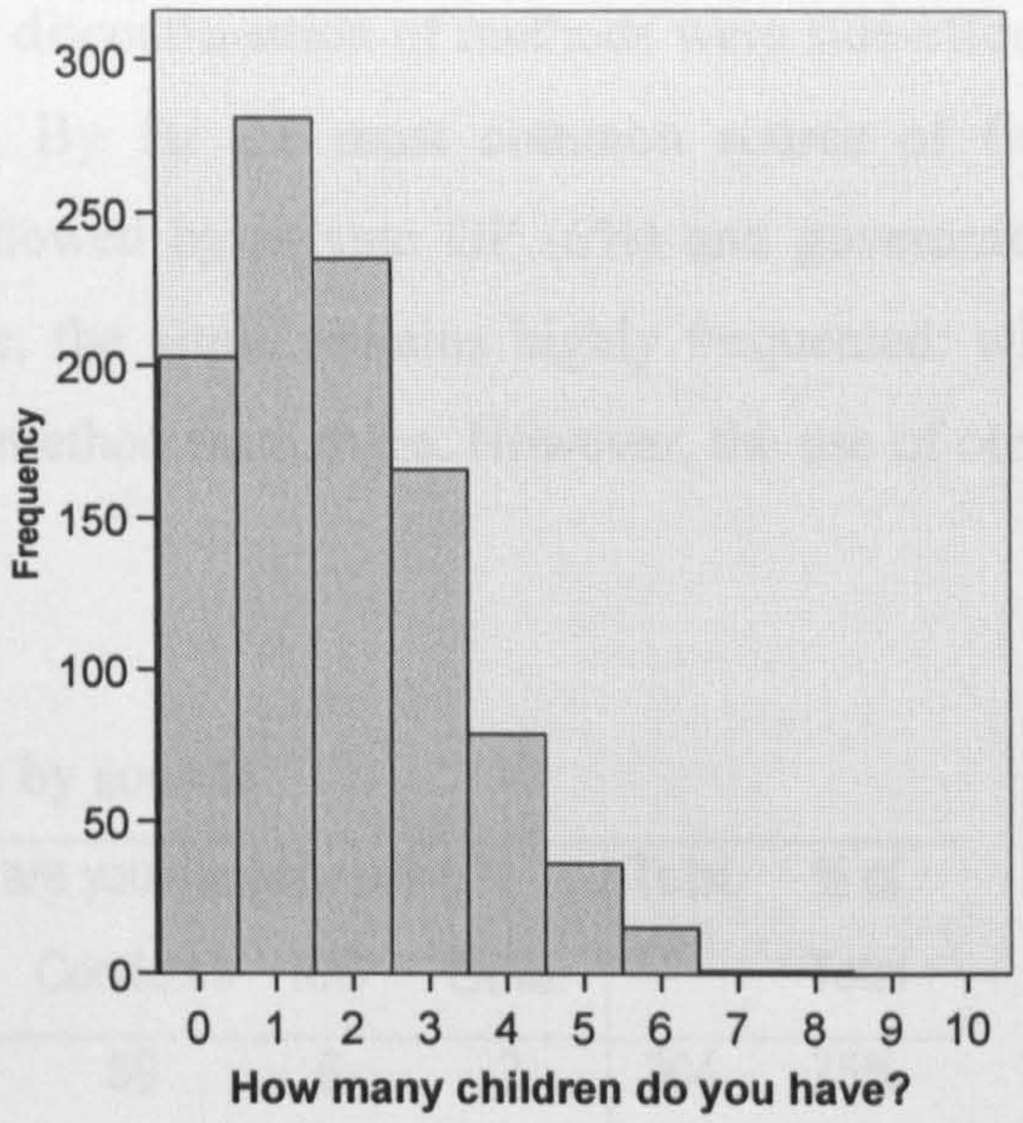


Figure 9-3 Histogram of age at sexual debut and number of children

Most women (73%) had used contraceptives (Table 9-5). Mean age to start using contraceptives for the first time was 20 years old, ranging from 12 to 41. Only 40% of women were using contraceptives at the time of the interview. Among ever users of contraceptive, injectables were the most common first contraceptive (62%) followed by pills (18%). Condoms appear to have increased in popularity for contraceptive purposes. Condoms were reported to have been used in 10% of protected first sex acts, while they make up 24% of current contraceptive use.

Table 9-5 Types of contraceptives used

	What was the first method you ever used? (among ever users) %	What method are you currently using? (among current users) %
Injectables	62%	43%
Pills	18%	25%
Condoms	10%	24%
IUD-Copper T	10%	3%
Sterilised	>1%	4%
Other	>1%	
Total	100%	100%

Of the women who had ever used contraceptives, almost half never changed method, another 47% switched once or twice and six women had used five or six different types of

contraceptive methods. The main reasons for discontinuation of methods were side-effects (53%) and wanting to get pregnant (26%). By far the most common source of first contraceptives is the public clinic (83%) followed by private GP (6%) and government hospital (4%). For current contraceptive use, the clinic remains highly frequented, with 74% having collected their last contraceptive method from there. However, the use of other sources was slightly more frequent.

Table 9-6 Sources of current contraceptives by source

Where did you get that method the last time you collected it?	What method are you currently using?					Total	% of Total
	Injectables	Pills	Condoms	IUD	Other		
Clinic	154	83	59	6	2	304	75%
Government hospital	9	3	0	0	14	26	6%
Youth Centre	0	0	1	0	0	1	>1%
Other public source	0	0	4	0	0	4	1%
Private hospital	3	1	0	2	1	7	2%
Pharmacy-chemist	0	4	16	0	0	20	5%
Private GP	9	9	1	5	0	24	6%
Supermarket	0	0	2	0	0	2	0%
Spaza shop	0	0	1	0	0	1	0%
Other	0	0	13	0	1	14	3%
Total	175	100	97	13	18	403	100%
% of total	43%	25%	24%	3%	4%	100%	

Contraceptive switching was more common than switching sources: 85% of women had only obtained contraceptives from one type of outlet, the highest number of outlet types used by a woman was three.

Familiarity with male condoms was high, with 63% having ever used a male condom with a partner. With their last partner with whom they used a condom, almost half (48%) suggested using a condom themselves, 39% of partners suggested condom use, and 13% both suggested using a condom. Many women who had used condoms with a partner had also collected condoms themselves (68%), most commonly from the clinic for free (64%), or paid for them from a chemist (11%). The three main reasons for their choice of condom source were convenience, price and location. The most common reason for collecting from the clinic was price; 'chemist' stands out for the number of women reporting getting their condoms there because 'it has the brand they like' (Table 9-7). Collected them 'from a box or machine' was popular (78%) and 'from a person behind a counter' less so (18%). The

free government condoms were quite common (77% of condoms collected by women were free), followed by LoversPlus (14%), the upmarket social-marketing condom. The lower priced social marketing condom, Trust, contributed 5%, and only 13 women (1%) reported buying private sector brands.

Table 9-7 Male condom sources, method of collection and reasons

	The last time you collected condoms: Where did you get them?									Total	% of total
	Clinic	Government hospital	Other public source	Private hospital	Pharmacy-chemist	Private GP	Super-market	Spaza shop	Other		
How did you collect them?											
From a box or machine	260	7	18	1	4	4	3	4	14	315	72%
From a person behind the counter	13	0	8	0	35	2	10	2	10	80	18%
From a person in a private room	2	0	0	0	0	1	0	0	0	3	1%
Off a shelf	6	0	3	0	9	1	10	0	4	33	8%
Other	0	0	1	0	1	0	0	0	5	7	2%
Total	281	7	30	1	49	8	23	6	33	438	100%
% of total	*64%*	*2%*	*7%*	*<1%*	*11%*	*2%*	*5%*	*1%*	*8%*	*100%*	
Why did you collect them there?											
I happened to be there anyway (convenience)	73	4	13	1	7	5	10	4	12	129	30%
It was the closest place (location)	68	2	12	0	8	3	5	1	7	106	24%
It was an anonymous place (privacy)	1	0	0	0	0	0	0	0	0	1	<1%
It was cheap or free (Price)	106	1	1	0	0	0	1	0	3	112	26
I knew I would find them there (reliable supply)	30	0	3	0	4	0	2	0	2	41	9
Shorter wait	0	0	0	0	2	0	0	0	1	3	1%
Friendlier service	2	0	0	0	3	0	0	0	2	7	2%
Has the type/brand of condom I like	1	0	1	0	21	0	5	1	3	32	7%
Other	0	0	0	0	4	0	0	0	3	7	2%
Total	281	7	30	1	49	8	23	6	33	438	100%

Although 77% of women had heard of the female condom, just 39.2% had ever seen one, and only 3% (28 women) had ever tried one. The most common reason for not trying a female condom, among those who had seen one, were: that they never thought about it (29%); they did not like the way they looked (18.2%); they expected discomfort/pain (16%); they could not find one (14%); couldn't afford one (8%) and they didn't know how to use it (4%) (Table 9-8).

Table 9-8 Reasons for not trying the female condom

Reasons for not trying a female condom	Frequency	% of total
Never thought about it	108	29%
Do not like the way they look	68	18%
Expect discomfort/pain	58	16%
Couldn't find one	51	15%
Couldn't afford	30	8%
Did not know how to uses it	15	4%
Does not need HIV or pregnancy prevention	14	4%
I wanted to but my partner refused	12	3%
Afraid to use/doesn't look safe	6	2%
I was using a male condom	2	1%
Married	2	1%
Don't know	2	1%
Other	4	1%
Total	372	100%

Note: there were 27 missing reasons for not trying a female condom from 399 women who had heard of it.

Of the women who had ever used a condom and had ever collected one themselves, most collected their last condoms for free (65%), from a person behind the counter (55%), at a clinic (30%), or a chemist (30%). The reason for this choice was mostly the convenience of already being at the source (40%).

The vast majority of women reported that their last sex act was either with their husband (43%) or a regular partner (56%); only 6 of 1017 women interviewed reported that their last sex act was with a casual acquaintance. No women reported that their last sex act was with someone they just met, or with a paying partner. Thirty-eight percent of women had ever experienced difficulty in negotiating condom use. In their last sex act, 31% reported using a

condom. Table 9-9 shows the main reasons women gave for using or not using a male condom.

Table 9-9 Main reasons for using and not using a condom in women's last sex act

Main reason a condom was used?	Frequency	Percent
Dual protection	173	55%
HIV prevention	70	22%
Pregnancy prevention	43	14%
STI prevention	16	5%
Other (not specified)	5	2%
Because it was that time of the month	3	1%
Breast feeding	2	1%
HIV positive	1	>1%
There was a misunderstanding	1	>1%
Lack of trust	1	>1%
Health workers told me to use it	1	>1%
We use it every time	1	>1%
I feel like using it	1	>1%
Total	318	100%

Main reason a condom was not used	Frequency	Percent
I did not want to[41]:	279	40%
I am not worried about HIV or STI	*114*	*16%*
They trust each other	*101*	*14%*
I do not like condoms	*64*	*9%*
My partner refused/ partner doesn't like, afraid of partner	226	32%
Never thought about it	54	8%
I want to get pregnant	52	7%
We did not have one at the time	47	7%
Use other method to prevent pregnancy	22	3%
Cultural norms (married, Christian, age)	8	1%
Did not know how to use it	5	1%
Side effects/pain	4	1%
Condoms cause AIDS	3	>1%
I use it only when I am sick	2	>1%
It was rape	1	>1%
Total	703	100%

The main reason for using a condom was dual protection (54%) followed by HIV prevention (22%). The main reason for *not* using a condom was because they did not want

[41] The following three actual responses fall into this general category.

to (40%), either because they were not worried about HIV/STI, they trusted their partner, or they don't like condoms. Almost a third did not use a condom because their partner either refused or she did not dare ask.

HIV knowledge and risk perceptions: HIV knowledge was relatively high, 40% knew the correct answer to all eight of the questions, and only 13% had five or less correct answers. Women's own perception of their risk was very equally distributed between the four risk categories: no (26%), low (23%), medium (26%) and high (22%).

9.6. Comparison of the study locations

The profiles of the three locations reflect the targeted differences in socio-economic status (Table 9-10). Generally it can be seen that Zonkiziswe is the poorest of the three areas. It has the highest number of participants living in shacks and the highest crowding index. On average participants had the lowest social capital, number of assets owned, age, education, and level of employment. Their age at sexual debut was the youngest, with the lowest proportion of women who had ever used a condom and the lowest HIV knowledge scores. Spruitview is on the other end of the spectrum with the highest: portion living in self owned brick homes, level of social capital, number of assets owned, age, education, level of employment, age at sexual debut, ever use of a male condom, and HIV knowledge. Whether the head of household is the participant herself or considered her husband as head and the number of children are similar between Spruitview and Zonkiziswe, while the statistics for Vosloorus were lower.

Table 9-10 Comparison of statistics from the three study areas

	Location			
	Zonkiziswe	Vosloorus	Spruitview	All
Lives in a shack or a room outside	76.5%	13.3%	2.2%	27.1%
Lives in a self owned brick home	11.7%	50.1%	91.1%	43.3%
Crowding index (people per sleeping room)	2.6	2.2	1.9	2.3
Social capital	1.7	2.4	2.6	2.3
Speaks Sotho at home	13.9%	25.6%	40.0%	23.6%
Speaks Zulu at home	67.0%	47.7%	35.6%	51.5%
Number of assets owned	4.4	5.5	6.4	5.3
Household head - Husband	50.4%	46.1%	53.3%	47.4%
Household head - Self	21.3%	15.5%	20.0%	17.0%
Age	30.5	31.8	33.2	31.5
Education in Years	8.1	10.6	11.5	10.0
Employed part-time or full-time	18.7%	39.5%	46.7%	35.1%
How many children do you have?	1.9	1.8	1.9	1.8
Age at sexual debut	17.3	18.0	18.2	17.8
Male condom ever use	40.1%	59.4%	59.5%	55.2%
HIV knowledge score (on a scale of 0-8)	6.4	7.1	7.3	6.9
n=	230	742	45	1017

9.7. Generalisability

9.7.1. Representativeness of study participants' households

The last column in Table 9-1 shows asset ownership in urban South Africa in 2003. Though the proportions who own each asset type appear similar, the ownership of a telephone (70% DHS and 87% in Ekurhuleni) is the largest difference. In the DHS 3% reported having none of the assets, while in Ekurhuleni this was 1%. These may indicate Ekurhuleni being slightly better off in terms of household wealth. In addition Table 5-2 reiterates how South African inequalities within small geographic areas are easily masked by averages.

9.7.2. Representativeness of study participants' own characteristics

It is interesting to note the high presence of Zulu speakers in the sample. In the urban South African adult female population in the DHS, Zulu speakers only represent 14% of respondents, and among women living in informal urban areas, they represent 30%, and

among this group in Gauteng, it is 26% (Table 9-4). This may highlight a dimension of the sample that could suggest less generalisability due to the overrepresentation of Zulu speakers, relative to other language (ethnic) groups. However, Ekurhuleni was chosen in as a township with no obvious reasons to consider it different from other townships surrounding Johannesburg. The survey team, who ran this survey, is encountering the same high levels of representation of Zulu speakers in their current Orange Farm survey. This could have three explanations: 1. a bias originating in the sampling methods, 2. true high presence of Zulu speakers in townships surrounding the Johannesburg relative to other townships in Gauteng. 3. Changes in the population composition between the 2003 DHS survey and this survey. If Zulu women's preferences are different from non-Zulu women's preferences then the sample estimates will be biased at some level of extrapolation (up to Gauteng for the first two, and beyond Gauteng for the third).

Table 9-11 Women's languages by household location: comparison of Ekurhuleni sample with DHS 2003

	DHS 2003 Urban women	Informal, Urban	Gauteng, Informal, Urban	***Ekurhuleni***
English	25%	5%	2%	*1%*
Afrikaans	18%	13%	0%	*<1%*
IsiXhosa	11%	19%	11%	*6%*
IsiZulu	14%	30%	26%	*52%*
SeSotho	16%	15%	28%	*24%*
SeTswana	8%	7%	8%	*3%*
SePedi	5%	7%	16%	*5%*
SiSwati	2%	3%	2%	*1%*
TshiVenda	0%	0%	1%	*1%*
ZiTsonga	1%	1%	5%	*8%*
isiNdebela	0%	1%	1%	*<1%*
Other	0%	0%	0%	*<1%*
Total	100%	100%	100%	*100%*
n	4095	535	125	*1017*

In the 2003 DHS, 3% of urban women age 15-49 years had no formal schooling, 47% had started but did not completed secondary school, and 24% had completed secondary school. In Ekurhuleni (age 18-49) this was 3%, 45%, and 27% respectively. In the 2003 DHS 36% and 6% of urban women were employed full-time or part-time, respectively, totalling 42% in either type of employment; in Ekurhuleni, this was 25% and 10%, in full and part-time

employment, and 35% in either type of employment. It appears that Ekurhuleni, at least on these two variables, is fairly representative of urban South African women, with slightly more completing secondary school,l but less in full-time employment.

9.7.3. Representativeness of study participants' reproductive histories

The mean age at sexual debut was 17 in the NMS, 20 in the DHS, and 18 years in Ekurhuleni. The average number of children is only available in the DHS. This was 1.6 for urban women in the DHS and 1.8 in Ekurhuleni. In the NMS 75% of women had ever used contraceptives, 73% had in the 2003 DHS, compared with 72% in Ekurhuleni. Age at first contraceptive use was the same in the NMS and Ekurhuleni (20 years). Injectables were the most popular contraceptive to start out with, 54% of contraceptive users (ever users) used injectables first, compared with 62% in Ekurhuleni. Of urban women in the DHS 51% were currently using contraceptives, while this was 40% in Ekurhuleni. The use of condoms for among contraceptive users was much lower with 12% urban women in the DHS, while this is 24% in Ekurhuleni. Reported condom use at last sex act in the NMS was 26% among urban women, 29% among urban women in the DHS and 31% here.

Table 9-12 shows the sources of current contraceptives in the 2003 DHS, comparable with Table 9-6 above. A popular source in the 2003 DHS was the family planning clinic, which was not mentioned in our Ekurhuleni sample. Clinics were the most popular source for both, however the DHS shows government hospital more commonly used (23% versus 7% in Ekurhuleni), and GPs less often used (4% versus 8% in Ekurhuleni).

Table 9-12 DHS 2003 Source of supply for modern contraceptive methods

Last source for current users	Current contraceptive method: Injectables	Pill	Male condom	IUD	Female sterilisation	Other	Total	
Clinic	976	265	185	9	31	8	1474	44%
Government hospital	262	76	51	8	380	7	784	23%
Family planning clinic	226	126	57	2	0	1	412	12%
Mobile clinic	177	37	14	1	0	0	229	7%
Private hospital	14	16	9	4	130	9	182	5%
Pharmacy-chemist	0	66	37	0	0	2	105	3%
Private GP	62	44	9	14	12	0	141	4%
Other	0	13	28	1	4	0	46	1%
Total	1717	643	390	39	557	27	3373	100%
	51%	19%	12%	1%	17%	1%	100%	

Male condom use: 33% of women in the NMS reported using a condom at their last sex act, in Ekurhuleni this was 32%. Free condoms were most popular in both surveys, with 70% accessing free condoms in the NMS and 77% in Ekurhuleni. Brand popularity was slightly different with 18% accessing LoversPlus, 8% Durex, and 3% Trust in the NMS; in Ekurhuleni these shares were 14%, 2%, and 5%, respectively. This corresponds to higher popularity of the free and low price brand (Trust) and lower popularity of the more expensive condoms LoversPlus and Durex. Although the questions were posed slightly differently, it can be seen that in both the NMS and Ekurhuleni, the most popular source of condoms was the clinic, followed by the pharmacy.

Overall, there seems to be high correspondence between the characteristics of the study participants and those in the general adult urban female population in South Africa.

9.8. Validity and other data issues

9.8.1. Introduction

This section reviews the responses to the axiom testing questions to assess the quality of the survey and the validity of the responses and provides a further review of other data issues that arose. As the last choice in the questionnaire, an additional choice set was added to test axioms of dominance and stability. In six of the DCE versions, respondents received one extra physical attribute question exploring reporting bias.

9.8.2. Version rotation

By having 17 fieldworkers and rotating the questionnaire daily, the aim was to achieve an equal number of responses to each questionnaire version, and distribute any interviewer effects equally over the versions. On average 50.8 questionnaires of each version were completed, ranging from 42 (version M) to 59 (versions L and H).

9.8.3. Respondent fatigue

Although there was only one questionnaire with one missing response to the product attribute DCE's, there were 27 (2.7%) questionnaires with one missing DCE-distribution response and one with two missing responses. In all cases these occurred at the last (or last two) DCE questions. This suggests the presence of respondent fatigue among women (or interviewers) towards the end of the questionnaire.

9.8.4. Orthogonality

At the time the study was designed, SPSS ORTHOPLAN procedure was considered an acceptable method for generating designs. However, when testing the design for orthogonality using the software on the diagnostic website by Street and Burgess [439], it became clear that there was a loss of orthogonality. The diagnostic programme would not converge for the physical attributes design and showed low levels of design efficiency for the distribution attributes. This leads to much noise in the estimates, and reduces the possibilities of estimating more sophisticated models with this data (such as attribute interaction effects and random parameters logit model with correlations) because of correlations in the data causing the models to not converge.

9.8.5. Dominance and stability[42]

Of the 155 responses to the test of dominance (also referred to as internal consistency) 26 women (17%) chose the dominated alternative (price choices in Table 9-13). In the choice sets there happened to be a number of sets in the product attribute experiment where the alternatives differed on one attribute only, but had not intentionally been set up to test for dominance. Here the non-dominant alternative was chosen in 21% of choices. There were also a number of scenarios where the alternatives differed on pregnancy prevention 0% versus higher pregnancy prevention, but 0% pregnancy prevention may be the dominant alternative for women who do desire pregnancy.

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[42] These questions were part of the distribution attribute DCE, but is discussed here most of the other validity tests relate to the product attribute DCE.

Table 9-13 Test for dominance

	Choose dominant alternative		Violations
	N(chose dominant alternative) /N(choices)	%	
Consistency test			
Low – high price (R5- R20)	51/57	90%	
Medium – high price (R10-R20)	78/98	80%	17%
Part of design			
Secrecy (Yes)	37/62	60%	
Pregnancy prevention (55%-75%)	34/41	83%	
Pregnancy prevention (75%-95%)	126/146	86%	21%
Total	326/404	81%	

To test for stability of preferences, the first of the distribution scenarios was presented again at the end. Nineteen percent changed their response to the same scenario when it was presented after 3 questions.

Therefore, in 1% to 21% of responses there were violations of the axioms of monotonicity (dominance) and stability. This will lead to noise in the utility estimates. However we have not removed them from the analysis as they were only administered on sub-samples of the study population. These estimates are well within the range of internal consistency identified in the literature. For comparison with the literature on internal consistency, studies report ranges between 1% and 27% [407, 394, 398, 408, 404, 303, 409, 410].

9.8.6. Non–trading and non-switching behaviour

There are two reasons people have been observed to not make trade-offs between the attributes levels. Firstly if choices are difficult, respondents use simplifying heuristics to make choices easier [405, 366]. This means that they may choose the attribute most important to them and make their choice solely by comparing the levels of that attribute. The other reason for observing such behaviour is that the range of the other attributes is not wide enough to induce trading, which is a design flaw rather than reflecting inconsistent responses [405]. In this study assessment of non-trading behaviour is undertaken with reference to the HIV effectiveness attribute. Table 9-14 shows the number of choice where participants were faced with different HIV effectiveness levels in the rows and the number of choices they made in favour of the highest HIV effectiveness level.

Table 9-14 Dominant attribute choices

Nr. Of HIV dominant choices made	Possible number of choices with different HIV effectiveness' per participant			
	3	**5**	**6**	**Total**
0	1	2	38	41
1	4	11	52	67
2	5	20	90	115
3	**9**	37	110	156
4	0	16	122	138
5	0	**49**	162	211
6	0	0	**289**	289
Total	19	135	863	1017

The number of people always choosing alternative with hgherst HIV effectiveness: 9(3 out of 3 possible) + 49 (5 out of 5 possible) + 289 (6 out of 6 possible) = 347

In this study 347 (34%) people always chose the alternative with the highest HIV effectiveness, suggesting quite strong dominant attribute preferences. Forty-one (4%) always chose the alternative with the lower HIV effectiveness. The remaining 629 (62%) chose some of each[43].

Figure 9-4 shows the distribution of respondents' choices between A, B and C. There were 104 (10%) respondents who never switched their response. Ninety-four (9%) respondents said they would never switch from doing what they did the last time they had sex. Five respondents always chose A and 5 always chose B in the product attribute choices. 578 (57%) said they would always switch to one of the choices and not do what they did last time they had sex. The remaining 344 (34%) respondents changed their responses between one of the product alternatives and 'neither' depending on the product attributes.

[43] In Table 9-14 attribute levels of the neither option are included, i.e. if Neither represented using a condom and was chosen over A, and B with for example 55% and 75% HIV effectiveness, this was considered a dominant choice. When all HIV effectiveness levels were equal (only possible when 0.95) no dominant choice was possible based in HIV effectiveness, and were thus not part of the analysis. Alternatively, it could be argued that Neither is a different kind of choice and should be excluded.

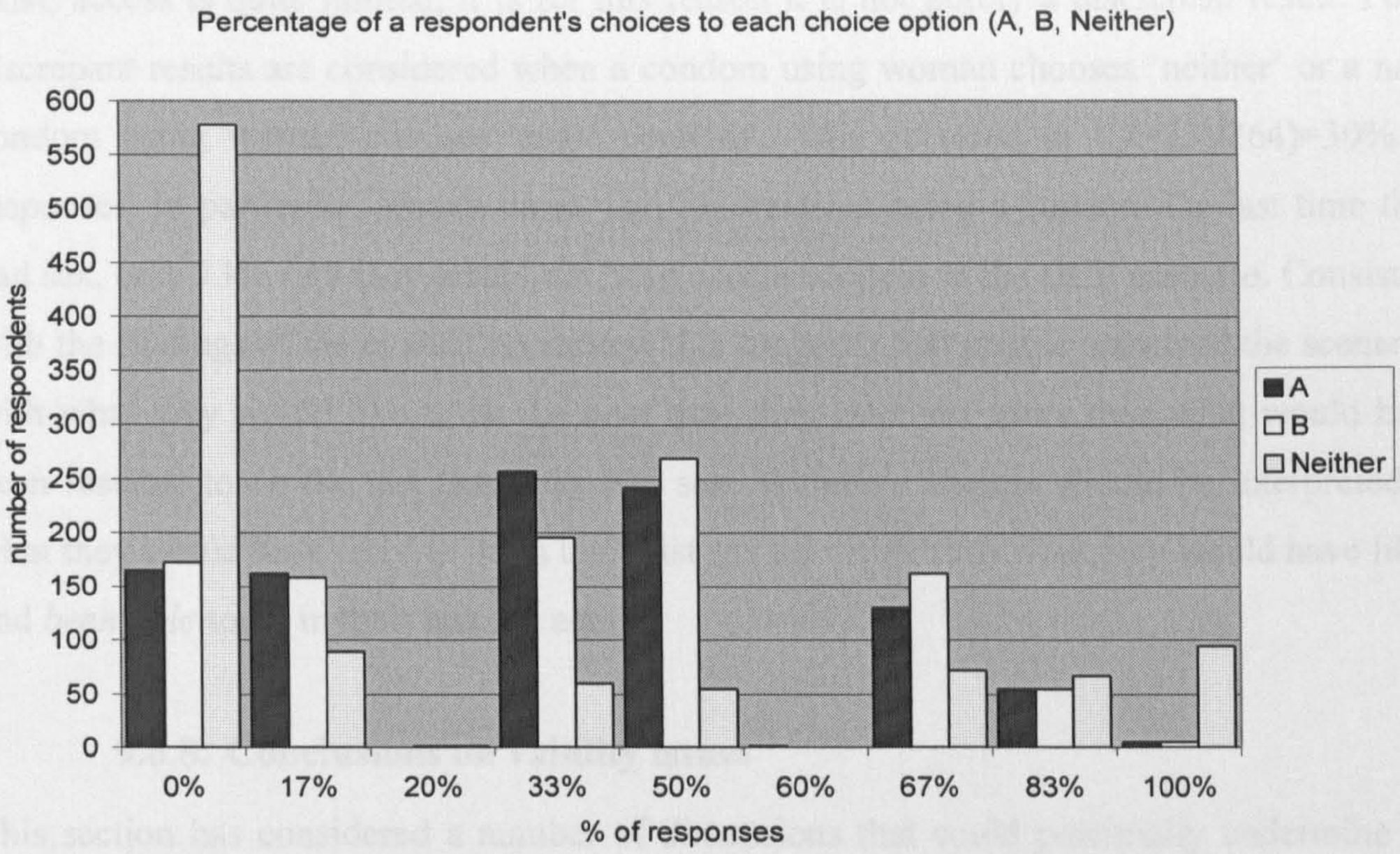


Figure 9-4 distribution of respondents' physical attribute choices over alternatives

9.8.7. Reporting bias

To explore reporting bias, one scenario was presented with the choice between male condom, female condom, and 'neither'. This is analysed with cross tabulation and presented in Table 9-15.

Table 9-15 Reporting bias: cross tabulations of choice among male and female condom and neither, and reported use in last sex act.

Would you have used one of these products the last time you had sex or would you have still done what you did the last time you had sex?	The last time you had sex, was a condom used?					
	No		Yes		Total	
Male condom	71	40%	51	59%	122	46%
Female condom	84	47%	28	33%	112	42%
Neither	23	13%	7	8%	30	12%
Total	178	100%	86	100%	264	100%

Of women who reported using a condom in their last sex act, 59.3% said they would have used a condom in response to the DCE scenario, 12.9% of women who did not use a condom said they would not have used a condom. This gives ((23+51)/264)= 28% of responses which were representative of their last sex act. It is a bit complicated to interpret the responses of women who said they would use the female condom, since though they

exist, access is quite limited; it is for this reason it is not purely a discrepant result. Fully discrepant results are considered when a condom using woman chooses 'neither' or a non-condom using woman chooses 'male condom'. This occurred in ((7+23)/264)=30% of responses. In particular, among those who reported not using a condom the last time they had sex, only 13% said they would not have used a condom in the DCE scenario. Consistent with the findings of the evaluation survey, this suggests that people answered the scenarios with what they would like to do the next time they have sex more than what would have been feasible to do the last time they had sex. Women's choices should be interpreted as what they would have liked to do in their last sex act rather than what they would have liked and *been able* to do in their last sex act.

9.8.8. Conclusions on validity issues

This section has considered a number of dimensions that could potentially undermine the validity of the estimation results: respondent fatigue; orthogonality; dominant preferences; stability of preferences; non-trading behaviour. The issue non-trading behaviour observed with the HIV effectiveness attribute, raises the tension on how to design DCEs when realistic ranges of attributes are not wide enough to induce trading behaviour in favour of other attribute levels. Though, violations of the other axioms were observe, the literature suggests the levels are acceptable.

9.9. Conclusions

This chapter has provided an overview of the sample obtained, and a description of the women's socio demographic backgrounds, their reproductive histories, and their reported sexual behaviour. These were compared with data from larger nationally representative surveys in South Africa, specifically the South African Demographic and Health Survey 2003 and the Nelson Mandela Survey containing sexual behaviour data from 2005. Generally the sample from Ekurhuleni did not appear to be very different from urban women in the national surveys, though the ownership of some assets, such as phones, was higher and the percentage of people owning none of the assets in Ekurhuleni was lower than in the general South African urban population. Reproductive histories and sexual behaviour were also strikingly similar between the women in this survey and women from the general population of urban South African women.

This chapter has also considered a number of issues related to the validity of women's responses, the trade-offs they make and ultimately the estimation results. Though violations of many of the key axioms were observed, the rates of these violations were generally

within the range of the literature. The next chapter explores women's directly elicited preferences to identify market segments.

Chapter 10. Exploration of preferences and market segments

10.1. Introduction

As in the methods section, where a number of iterations were undertaken to develop the final survey tool, this chapter presents the iterative process used to develop an estimate-able discrete choice model that includes a succinct number of socio-demographic characteristics. Although socio-demographic variables are included in discrete choice models, such unlabelled discrete choice models quickly become unwieldy due to the fact that they are included as cross products of the attributes, rather than as single variables [430]. This makes them unsuitable for broad exploration of potential variables representing different women's characteristics. This chapter presents women's directly elicited preferences for products, their attributes and their distribution and subsequently explores the relationship between socio-demographic characteristics and women's directly elicited preferences. This chapter aims to answer the following questions :

1. Which attribute levels are preferred when presented one by one?
2. What are the demographic characteristics of the market segments identified using a three step approach?
3. What are the determinants of women's willingness to pay values for the different women's barrier methods? How do they differ across products?

Together, these supporting analyses provide guidance on which socio-demographic variables to carry forward into the analysis of the choice experiments.

Section 10.2 describes this chapter's methods. Section 10.3. presents an overview of women's preferences for each of the attributes, when presented on its own. Section 10.4. presents an overview of the willingness to pay questions. Section 10.5. looks at grouping women into market segments using different types of preference data. Section 10.6. analyses the determinants of willingness to pay. The last section suggests some key variables to carry forward into the analysis of women's preferences.

10.2. Methods

This chapter uses three methods to address its aims. Firstly basic descriptive statistics are used to explore women's directly elicited preferences and their willingness to pay values for the different products and analysis of variance (ANOVA) is used to consider interactions

between the importance of secrecy and women's characteristics and preferences for distribution strategies. Secondly a market segmentation analysis is used, and thirdly regression analysis is used to identify key socio-demographic determinants of their product preferences as represented by their directly elicited willingness to pay. The last two methods are described in more detail below.

10.2.1. Identification of latent product profiles and market segments: methods

Identification of the demographic characteristics of market segments ws done in four steps (Figure 10-1).

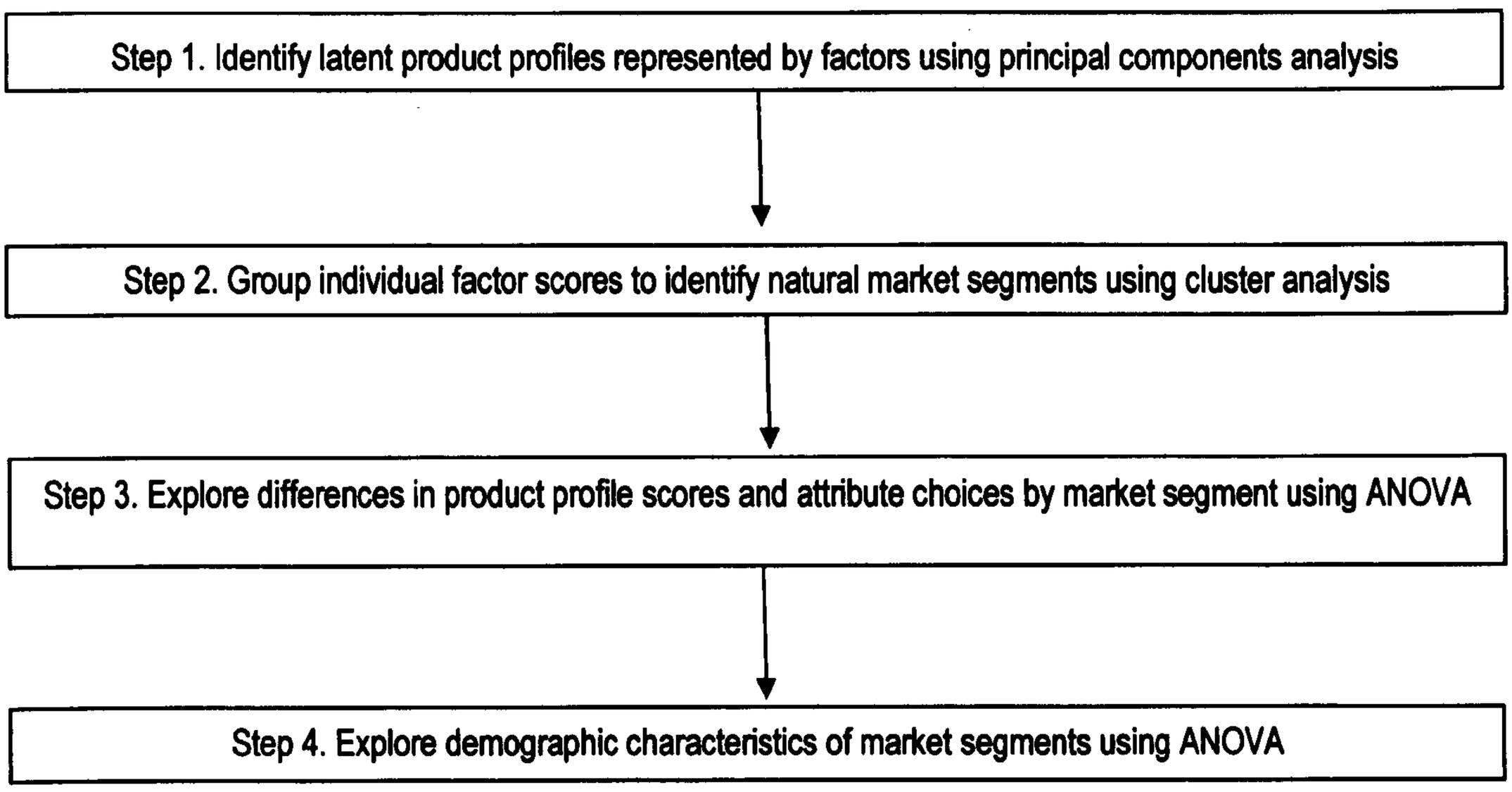


Figure 10-1 Steps in identification of characteristics of markets segments

In the first step, principal components analysis is used to identify those product/distribution attributes that define latent product profiles (represented by the factors that are generated) [452, 451]. Included in the analysis are all of the expressed preferences (left column in Table 10-5). Most variables are categorical. Variables entered as continuous variables are product effectiveness in preventing HIV (35%-95%) and pregnancy (0%-95%) and willingness to pay for a single use and reusable product. Because of this combination, we use the correlation matrix rather than a covariance matrix to estimate the principal components [451]. The output of principal components analysis is a number of factors which we can call product profiles. These profiles contain weights for all of the product/distribution attributes, based on their underlying correlations. These weights represent their importance in defining

that profile. Product profiles can be interpreted as attributes that are often chosen together, if positive and large, or tend not to be chosen together, if negative and large.

From the product profiles, we can group consumers into market segments by their product attribute choices (step 2). Based on the attribute weights from the principal components analysis, a variable can be generated containing summary profile scores for each participant for each product profile. These represent the strength of each woman's preference for each profile. Based on these product profile preference scores, cluster analysis is then used to identify natural groupings of these preferences. These clusters represent different market segments. Step 3 uses analysis of variance (ANOVA) to identify statistically significant differences in the mean product profile scores and their product/distribution attribute choices between the different clusters. This is primarily to see if the empirically generated clusters have are consistent with our a priori expectations (if they are intuitive).

Step 4: The demographic and behavioural characteristics of each of these market segments can then be identified using a one-way ANOVA. The demographic characteristics and responses from reproductive health histories of women are entered as the independent variables into the ANOVA to test for a difference in the means of the characteristics between the different clusters. The most significantly different demographic characteristics will then be included as variables in the analysis of determinants of willingness to pay for the barrier methods.

10.2.2. Estimation of determinants of willingness to pay

Three main regression models were used to estimate determinants of willingness to pay: ordinary least squares (OLS), Tobit, and interval regression (also called grouped data regression [454]). This section describes the estimation models and their specification.

The OLS models were estimated with the dependent variable in three functional forms. The first with the actual WTP values, the second as logarithms of the WTP values, and the third as logarithms of WTP value+1. The logarithmic transformation was undertaken because the data are highly skewed (See Figure 10-2 and Table 10-4). However ln(0) is not defined, so this would lead to the exclusion of all observations with WTP values of 0. This is between 50% and 87% of the responses for the different products. To address this problem, Donaldson et al. (1998) suggest taking the logarithm of the WTP value +1, in which case the 0 values are included in the estimation sample (as ln(1)= 0).

Tobit was developed to correct for biases that occur in OLS estimation that are introduced when using censored data [419, 455]. When an open-ended WTP question is asked the lowest amount that one can respond is 0. Zero-values then generally capture both real '0' values (willing to use if free), and those who dislike the product and would thus have to be paid to use it (negative WTP). In the open-ended WTP questions, women were given the choice to opt out, and therefore 0 values should reflect willingness to try but only at a 0 price. It is not expected that these data are censored in the same manner as most WTP responses are. The payment scale questions for single use and reusable products are censored, however, both at the lower end, at 0, and at the upper end, at Rand 20 and Rand 80, respectively. Two Tobit models were estimated with the open-ended WTP responses. The first with the data as unchanged (thus including only those willing to try in the sample) and the second transforming those who opted out to have a 0 WTP value, which is the form of data in which Tobit models are generally applied. The open-ended WTP questions were then left censored at 0, and the payment scale WTP questions were considered both left and right censored. These estimates can then be compared with the estimates generated using the OLS and interval regression.

Interval regression is used when the data are grouped, either because the data are collected in intervals rather than exact numbers or because people's responses heap at rounded numbers [454]. An example of the first is when using a payment scale, as we did when we limited the WTP responses for a single use product to 0, 5, 10 and 20 Rand, and for a reusable product to 0, 20, 40 and 80 Rand, the second type of grouping can be seen by the peaks in response frequencies at round numbers in the open-ended willingness to pay responses presented in Figure 10-2. Specification of the intervals for the payment scale data for the single use product is presented in Appendix Table A10-1.

The basic models are estimated using a number of functional forms (see Table 10-1). The models were first estimated in full in an initial exploratory analysis. Stepwise regression is then used to obtain the most parsimonious model for each product with significant variables only. Stepwise regression is used with an entrance criterion of a p-value of 0.2 or less for each variable. This provides guidance on which variables are not significant in any of the different product regressions. The reduced model is then discussed and variables for inclusion in de DCE are suggested.

Table 10-1 Models and functional forms estimated for determinants of WTP

	WTP for				
	Diaphragm	Microbicide	Female condom	Single use	Reusable
Long (variables from Eq. 10-1)					
OLS- Values	x	x	x	x	x
OLS- Logarithms	x	x	x	x	x
Tobit	x	x	x	x	x
Interval regression, with 0 as = 0 [0,0]	x	x	x	x	x
Interval regression, with 0 as ≤ 0 [...,0]	x	x	x		
Reduced (variables from Eq 10-2)					
* *OLS Values*	x	x	x	x	x
OLS-logarithms	x	x	x	x	x
OLS-Ln (WTP+1)	x	x	x	x	x
* *Tobit Values*	x	x	x	x	x
Tobit logarithms	x	x	x	x	x
Tobit on Log(WTP+1)	x	x	x	x	x
Tobit with opt- out as WTP=0	x	x	x	x	x
Interval regression, with 0=[0,0]	x	x	x	x	x
* *Interval regression, with 0=[...,0]*	x	x	x		
Reduced (excluding outliers)					
OLS	x	x	x		
Tobit	x	x	x		
Interval regression	x	x	x		

* Estimates from these models are presented in Table 10-7, all other results only presented in Appendix 10

10.3. Women's preferred attribute levels

10.3.1. Physical attributes

The level of HIV protection desired had little to do with women's perception of their own risk: cross tabulation of 'self-perceived HIV risk', and 'level of HIV protection required' (Table 10-2), did not show any particular pattern.

Table 10-2 Cross tabulation of self perceived HIV risk and needed HIV protection

	Do you need a product that provides very low, low, medium protection, or high protection against HIV				
Do you consider yourself at high, medium, low, no risk of getting HIV or becoming re-infected	Very low 35%	Low 55%	Medium 75%	High 95%	Total
1 High risk	1	5	9	208	223
2 Medium risk	2	0	13	245	260
3 Low risk	0	1	6	226	233
4 No risk	2	4	13	242	261
Total	5	10	41	921	977

For protection against pregnancy, of the few women (40) who said they did not want their HIV prevention product to prevent pregnancy, 74% wanted to get pregnant. However, of those wanting to get pregnant, 64% still chose a product with 95% pregnancy prevention. These findings suggest that most women who chose a non-pregnancy preventing product were expressing preferences consistent with their previously expressed desire to get pregnant. However, the majority of women who wanted to get pregnant did not give consistent responses in their preference for pregnancy prevention effectiveness of product (i.e. it would be expected that they would prefer products with low effectiveness against pregnancy, but many still stated they wanted a product that would provide high levels of pregnancy prevention). However, this could also mean that such a product would 'normally' be most useful to them, rather than relating the question to their current situation.

When presented with the four single use prices (R0, R5, R10, R20), 50% choose free distribution; 27% said they would pay up to R5, 15% would pay up to R10, and 9% said they would pay up to R20. Although these values were chosen to cover the range of prices of male and female condoms current available, it can be seen that these also happen to be the most frequently response values in the open-ended WTP question and can therefore be deemed quite appropriate. The open-ended willingness to pay responses were quite a bit higher than payment scale responses. For a reusable product, women were willing to pay more: 26.5% reported they would only use it if free, 44% reported being willing to pay up to R20, 17% would pay up to R40, and 13% would pay up to R80.

Women were asked if it was important to be able to use a product without their partner knowing (Box 8-4). Just under half (43%) said it was important, and 57% did not think this was important.

10.3.2. Distribution attributes

The preferred distribution channels were clinic (49%) and chemist (40%), while supermarket (7%) and corner store (5%) were rarely chosen. Distribution 'in a private room' was most preferred (38%), followed by 'from a dispensing machine or box' (28%); 'from a person behind a counter' (17%) and 'from a shelf' (16%) were less preferred. Thus those collection methods that were most private were preferred. Of the four advertising messages presented 'HIV prevention' (45%) had the largest preference, followed by 'women's empowerment' (30%), 'pregnancy prevention' (17%) and 'extra pleasure' (8%). This was counter to expectations that HIV prevention would have a negative association and HIV prevention messaging would make the product least attractive for women and their partners.

10.3.3. Interactions between the importance of secrecy and women's characteristics and preferences for distribution strategies

Table 10-3 shows the analysis of variance (ANOVA) of characteristics and preferences that were significantly different between women who did and did not consider secrecy important. Women were more likely to say that it is important to be able to use the product without their partner knowing if they: considered themselves at high risk for HIV (RiskHigh); preferred collection from the chemist, spoke Sotho at home, and thought microbicides or the diaphragm would be the most suitable HIV prevention product for them. Characteristics[44] of women who did not think secrecy was important were: considered male or female condoms their preferred HIV prevention product; considered themselves at no risk of becoming infected with HIV; lived in higher socio-economic status households; preferred the clinic as place for product collection; preferred promotion for extra pleasure; preferred collection from a person behind the counter or from a shelf; and older age.

[44] which a significantly higher percentage said it was not important than did say it was important

Table 10-3 Characteristics and preferences of women who do and do not consider secret product use important

Characteristics and preferences	Group means		Variables with significant difference between groups P-value (ANOVA)
	Secrecy important	Secrecy not important	
Considers themselves to be at HIGH risk of becoming infected with HIV	**27%**	18%	0.001
Male condom suits their reproductive health needs best	6%	**12%**	0.001
Female condom suits their reproductive health needs best	10%	**15%**	0.006
Collection from chemist preferred	**44%**	36%	0.007
Considers themselves to be at NO risk of becoming infected with HIV	22%	**29%**	0.008
Household SES	-9%	**7%**	0.009
Collection from clinic preferred	45%	**52%**	0.024
Sotho speaking at home	**27%**	21%	0.039
Promotion for extra pleasure preferred	6%	**9%**	0.040
Microbicides suit their reproductive health needs best	**53%**	46%	0.043
Diaphragm suits their reproductive health needs best	**32%**	26%	0.054
Collection from person behind counter preferred	15%	**19%**	0.084
Age	31.1	**31.9**	0.094
Collection from shelf preferred	19%	**15%**	0.104

Other characteristics were not significant at a 10% level.

This section has now provided a descriptive overview of women's directly elicited preferences for barrier methods and distribution strategies and their attributes. Generally, acceptability was highest for microbicides, followed by the diaphragm. Women showed less enthusiasm for the male and female condom[45].

10.4. An overview of the open-ended willingness to pay responses

Willingness and ability to try the products differed with the most women willing to try microbicides (74%), followed by 60% of women willing and able to try the diaphragm, and 56% willing to try the female condom. If a woman stated that she was willing to try a product but it was not something she thought she would use regularly it was categorised as

[45] In the next chapter the ordering of these preferences will be further explored.

"novelty use". Novelty use was highest for the female condom, with 22% of women who would be willing to try it also reporting it was unlikely to be something they would want to or be able to use regularly; this was 14% for the diaphragm, and only 5% for microbicides.

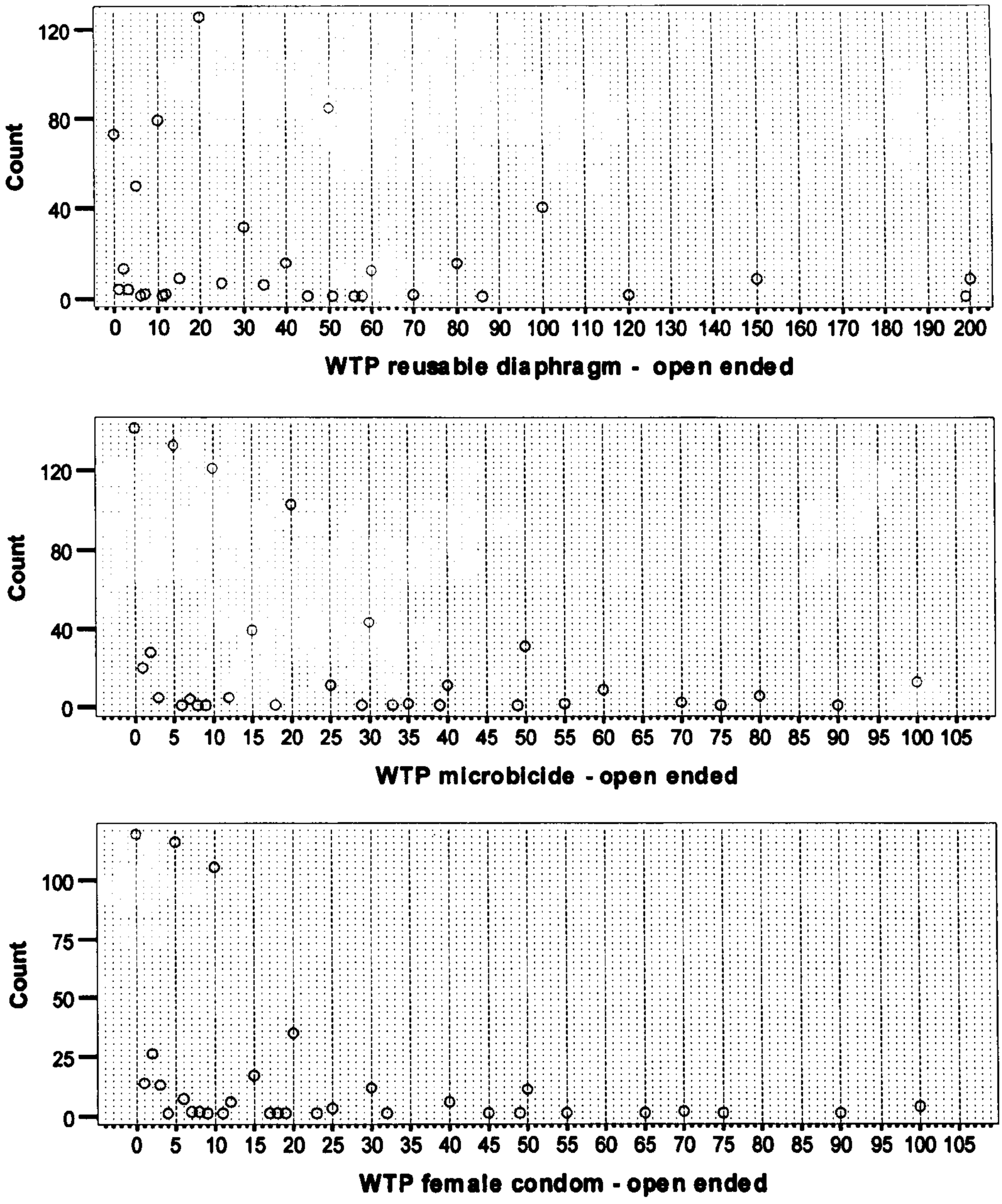
For the willingness to pay question, the diaphragm was presented as reusable, and microbicides as single use. Women who thought they would use a product regularly were willing to pay on average R37.58 for a reusable diaphragm, R17.44 for a single use microbicide, and R10.33 for a female condom (Table 10-4). Novelty values were lower for a diaphragm at R18.67 and for a microbicide (R12.95). Novelty value for the female condom was just slightly higher than its regular use value (R10.97). For comparison, social marketing condoms are also available in South Africa for R2 and R5 per packet of three. However, these responses were highly skewed, with median values far below their means.

Table 10-4 Willingness to pay for the diaphragm, microbicides and female condoms

In 2005 Rand	Mean Novelty use*	Mean Regular use	Mean All	Median All	Minimum All	Maximum All	Std Deviation All
Diaphragm	19	38	35	20	0	450	46
Microbicides	13	17	17	10	0	300	27
Female condom	11	10	10	5	0	250	18

* A WTP value is considered a novelty use value when a woman states she is willing to try a product but it is not something she thinks she would use regularly.

Figure 10-2 plots the WTP values. It shows the skewedness of the WTP responses and that the values are lumped together, with peak frequency of responses at round numbers (e.g.0, 5, 10, 20, etc.).



Note: very high values were excluded to make the figure more readable at the lower end. The values excluded were: for the diaphragm R300*1, R400*1, R450*1; for microbicides R150*5, R200, R300*2; for the female condom R250*1.

Figure 10-2 Count of open-ended willingness to pay values for the diaphragm, microbicides and the female condom

Consistent with the high 'willingness to try' and 'willingness to use regularly' of microbicides, 50% stated that microbicides would best suit their reproductive health needs, followed by the diaphragm (9%), the female condom (13%), and the male condom (9%).

10.5. Product/distribution categories and market segmentation

The analysis seeks to explore the existence of market segments to guide which variables to include in the analysis of the determinants of willingness to pay in Section 10.6.

10.5.1. Product profiles based on hypothetical preferences

Table 10-5 shows results of steps 1-3. Eleven latent product profiles were identified using principal components analysis.

Profile 1 represents a strong positive preference for distribution from a chemist off the shelf at higher prices, with a strong dislike for clinic distribution in a private room.

Profile 2 represents strong product preferences, with a positive preferences for the male condom in particular and a dislike of microbicides. Distribution for HIV prevention has a positive association, and women's empowerment a negative association. A dispensing machine or box at a supermarket distribution all contribute to this product profile.

Profile 3 represents a favourable attitude towards the female condom that would be promoted for woman's empowerment, with a strong dislike for promotion for HIV prevention. Distribution from a dispensing machine or box at spazas (cornershops in townships) contribute to this profile, while distribution from a chemist in a private room is negatively associated with this profile.

Profile 4 This profile is dominated by a very strong positive weight for the diaphragm, preferably distributed for pregnancy prevention in a private room at a chemists, and negative weights for microbicides and the male condom distributed for HIV prevention on a supermarket shelf.

Profile 5 shows a strong dislike for promotion for pregnancy prevention, the female condom and shelf distribution in supermarkets, with strong positive value for high levels of HIV prevention to be collected from a box or machine and promoted for women's empowerment or HIV prevention.

Profile 6 portrays a compilation of attributes as follows: male condom distributed for sale at clinics or the supermarket, but not the clinic, collected off a shelf and promoted for extra pleasure or women's empowerment. Promotion for HIV prevention has a negative weight.

Profile 7 places strong positive values on promotion for extra pleasure and is associated with higher prices, the female condom, but values promotion for women's empowerment and distribution from a supermarket shelf negatively.

Profile 8 has very strong dislike for collecting a product from a person behind the counter, and is associated with a preference for a product that can be used secretly. More appropriate distribution for a discreet product would thus be a shelf or a

dispensing machine or box. The only promotional message with a positive weight is extra pleasure.

Profile 9 This profile revolves around the female condom distributed from a spaza or a private room for women's empowerment.

Profile 10 Product attributes are most important for this profile: critical are high pregnancy and HIV efficacy and ability to use it in private, it also has a positive weight for collection from a person behind a counter.

Profile 11 This profile is dominated by higher pricing and supermarket distribution, with negative weights for the male condom, high levels of pregnancy efficacy, chemist distribution and promotion for extra pleasure.

Each latent product profile can be described by the larger weights of the attribute inputs. Higher values (in absolute value) represented variables with strong preference weights. To facilitate viewing, weights with an absolute value above 0.4 are presented bold, weights with an absolute value of less than 0.2 (not very important) are faded.

Table 10-5 Latent product profiles, differences in market segment valuations between the product profiles, and differences in attribute preferences between market segments

	Latent product profiles (Components)											Market segment means			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	p-value.*
Preferred product															
Male Condom	0.071	**0.440**	-0.078	-0.263	0.142	0.361	-0.008	-0.062	-0.103	-0.171	-0.222	0.10	0.05	0.11	0.07
Female Condom	-0.123	0.299	0.315	-0.047	-0.334	-0.071	0.281	0.022	**0.601**	0.078	-0.182	0.01	0.55	0.08	0.00
Diaphragm	-0.049	0.318	0.013	**0.803**	0.079	0.041	-0.269	0.010	-0.265	0.029	0.083	0.34	0.13	0.28	0.00
Microbicide	0.086	**-0.742**	-0.178	**-0.544**	0.069	-0.199	0.060	0.012	-0.102	0.020	0.174	0.55	0.27	0.52	0.00
Preferred product attributes															
HIV efficacy	-0.026	-0.186	-0.198	-0.036	0.308	0.160	-0.051	0.118	0.101	**0.502**	-0.194	94.88	88.77	93.43	0.00
Ability to use secretly	0.103	-0.174	-0.063	0.152	-0.055	-0.287	-0.313	0.258	-0.161	0.245	0.080	0.48	0.33	0.37	0.00
Pregnancy efficacy	-0.024	0.100	-0.025	-0.017	0.025	0.039	-0.017	0.131	-0.045	**0.751**	-0.299	92.60	73.17	88.52	0.00
Willingness to pay (payment scale)															
WTP single use product	**0.469**	0.009	-0.006	0.188	0.135	0.079	0.294	0.071	0.125	0.153	**0.525**	4.62	3.94	5.24	0.12
WTP reusable product	**0.481**	0.044	-0.057	0.196	0.196	0.233	0.353	0.095	0.164	0.124	0.337	26.34	22.11	28.55	0.03
Preferred source															
Spaza	0.062	0.109	0.276	-0.128	-0.151	-0.199	-0.176	-0.021	**0.430**	0.161	0.116	0.00	0.20	0.04	0.00
Clinic	**-0.852**	-0.074	0.088	-0.022	0.114	0.204	0.123	-0.001	-0.183	0.064	0.161	0.54	0.42	0.38	0.00
Supermarket	0.198	0.246	0.030	-0.308	-0.329	0.393	-0.233	0.065	-0.087	0.084	0.305	0.07	0.08	0.08	0.63
Chemist	**0.740**	-0.101	-0.224	0.240	0.122	-0.331	0.073	-0.035	0.048	-0.179	-0.375	0.40	0.30	0.50	0.00
Preferred collection method															
Shelf	**0.469**	0.166	-0.158	-0.277	-0.285	0.213	-0.289	0.372	-0.115	-0.058	-0.069	0.21	0.17	0.00	0.00
Person behind counter	0.228	-0.020	0.078	-0.036	0.004	0.096	0.047	**-0.899**	-0.134	0.231	-0.007	0.00	0.03	1.00	0.00
Private room	**-0.444**	-0.346	**-0.489**	0.361	-0.111	0.169	0.006	0.133	0.393	-0.120	0.000	0.48	0.39	0.00	0.00
Dispensing machine or box	-0.096	0.254	**0.593**	-0.132	0.351	**-0.438**	0.193	0.297	-0.218	-0.014	0.062	0.31	0.42	0.00	0.00
Preferred promotional message															
Women's empowerment	0.149	-0.392	**0.566**	0.081	0.318	0.293	**-0.452**	-0.015	0.237	-0.101	-0.046	0.29	0.29	0.33	0.52
Pregnancy prevention	0.013	-0.199	0.117	0.219	**-0.734**	-0.164	0.210	-0.027	-0.284	0.122	0.020	0.15	0.21	0.18	0.11
Extra pleasure	0.083	-0.071	0.023	-0.010	0.065	0.355	**0.577**	0.233	-0.200	-0.053	-0.262	0.09	0.04	0.07	0.03
HIV prevention	-0.190	**0.547**	**-0.618**	-0.234	0.221	-0.336	-0.055	-0.093	0.105	0.032	0.170	0.47	0.46	0.42	0.48
% variance explained by factor	11.2%	8.6%	7.9%	7.7%	6.5%	6.3%	6.1%	5.9%	5.6%	5.3%	4.9%	n= 650	199	166	
ANOVA testing for differences in product profiles by market segment (cluster)												64%	20%	16%	
Market Segment means 1	-0.08	-0.12	-0.23	**0.06**	**0.19**	0.07	-0.09	**0.47**	-0.22	0.09	-0.03				
2	-0.17	**0.45**	**0.63**	-0.15	-0.67	-0.41	**0.20**	0.13	**1.01**	-0.72	**0.13**				
3	**0.51**	-0.07	0.13	-0.07	0.05	**0.23**	0.10	-1.99	-0.36	**0.51**	-0.04				
p-value	>0.01	>0.01	>0.01	0.02	>0.01	>0.01	>0.01	>0.01	>0.01	>0.01	0.11				

10.5.2. Market segments

Applying cluster analysis to these product profiles (limiting to a maximum of five clusters) generates three market segments (clusters). Market Segment 1 contains 64% of the participants, 20% fall into Market Segment 2, and 16% into Market Segment 3.

The bottom part of Table 10-5 shows the results of the market segments analysis, as tested for significant differences in their preferences for the different product profiles using ANOVA. The first three rows represent the average profile value of each market segment and the 4th row is the p-value of the null hypothesis that the market segment means are the same (using ANOVA). With the exception of Profile 11, the market segments have different scores for each of the product profiles. Market Segment 1 has the least strong profile preferences and captures the preferences of the majority of participants. Market Segments 2 and 3 tend to have different groupings of their choices and more extreme scores. The highest positive scores for Market Segment 1 are for Profiles 4, 5, and 8; Market Segment 2 scores Profiles 2, 3, 7, 9, and 11 the highest; and Market Segment 3 gives highest scores to Profiles 1, 6, and 10. The last column of Table 10-5 tests for significant differences in women's choices for the different attributes by cluster. The columns 'Market segment means' show the average choices made by women in each cluster. Again most were significantly different from each other (as tested in an ANOVA at a 5% level), with the exception of willingness to pay for a single use product, supermarket collection and the promotional messages of women's empowerment, pregnancy prevention, and HIV prevention.

- Market Segment 1 (64%) had a higher preference for being able to use a product secretly and collect it from the clinic.
- Market Segment 2 (20%) differed most from the other two clusters on preferred product, with 55% of women in Market Segment 2 reporting that the female condom would be the product that suited their reproductive health needs most. They also chose lower levels of HIV and pregnancy efficacy necessary for them and gave, on average, the lowest willingness to pay values. Women in Market Segment 2 chose Spaza distribution more often than women in did in the other market segments and extra pleasure less often.
- Market Segment 3 (16%) had the strongest divergence from the other two in their preferences for collection methods, with all women having chosen from a person behind the counter. They also had the highest preference for chemist collection (50% chose collection from a chemist).

10.5.3. Demographic profile of market segments

Table 10-6 shows the descriptive statistics of the demographic characteristics ranked by the p-values test of differences between the three market segments. The market segments were significantly different at the 5% level for the first 15 variables. The greatest differences were found in level of social capital, the level of education, having paid for condoms the last time they collected them, the number of rooms in their house (but not the crowding index), their household socio-economic status and their asset index.

Market Segment 1 appears to be market segment with average personal characteristics, with Market Segment 2 representing women of generally lower socio-economic status and empowerment, and Market Segment 3 are those on the other end of the spectrum with higher socio-economic status and empowerment. These women are higher educated, more likely to be employed (45% versus 34% and 30%), more likely to have ever used a female condom, to have initiated condom use themselves the last time a condom was used, and to have purchased it[46]. However, the strong preferences of Segment 2 for female condoms make this picture less clear.

Conceptually, these also form intuitive target groups for introducing new barrier methods with different introduction strategies. However, what would this mean in practice for developing targeting strategies for a variety of barrier methods? The marketing literature suggests four criteria for evaluating the usefulness of market segments [456, 225, 429]:

- Measurability: Does the segment description provide sufficient information to identify and measure the size of the population in the segment?
- Substantiality: Are the segments large enough (in marketing think: profitable enough) to matter?
- Accessibility: Can they be reached with the product?
- Actionabilty: Can a marketing strategy be developed to reach the groups?

In brief, this study has measured relative sizes of the groups through the cluster analysis. The smallest cluster is 16%. It is not clear how demand for new barrier methods may vary between the groups as there does not seem to be one group with much higher unmet need (e.g. condom use was not significantly different between the three clusters). However the smallest group (cluster 3) did have much higher condom purchasing behaviour. As all of the clusters are urban, it is likely they can be reached both with targeting and promotion

[46] However they were not more likely to have used a condom in their last sex act.

strategies. However, one potential problem with these clusters might be that they do not have a sufficiently clear identity to provide actionable guidance to marketing.

Table 10-6 Demographic profile of market segments based on hypothetical preferences

	Market segment means			
	1	2	3	P-value
Variables that were significantly (p-value <0.05) different between clusters				
Social capital	2.27	2.04	2.57	<0.01
Education in years	10.04	9.31	10.92	<0.01
Did you pay for condoms the last time you collected them?	0.19	0.16	0.38	<0.01
How many rooms are there in your house?	4.29	3.85	4.64	<0.01
SES	0.00	-0.17	0.22	<0.01
Asset ownership score (from factor analysis)	0.02	-0.19	0.16	<0.01
Zonkiziswe resident	0.24	0.26	0.13	0.01
Lives in a shack or a room outside	0.28	0.32	0.18	0.01
Employed	0.34	0.30	0.45	0.01
Vosloorus resident	0.71	0.71	0.83	0.01
Have you ever used a female condom?	0.02	0.02	0.06	0.02
Does not want to become pregnant	0.59	0.48	0.60	0.02
How old were you the first time you had sexual intercourse?	17.85	17.51	18.17	0.03
Years living in location	13.10	14.28	15.65	0.03
Initiated condom use – Self	0.47	0.42	0.58	0.04
Variables that were not significantly (at p-value <0.05) different between clusters				
Age	31.12	32.35	32.25	0.06
Risk of becoming HIV infected - High	0.22	0.26	0.16	0.09
Risk of becoming HIV infected - Low	0.24	0.28	0.28	0.18
Initiated condom use - Partner	0.14	0.13	0.08	0.23
Are you currently pregnant?	0.04	0.06	0.02	0.29
Have you ever collected or bought a condom yourself?	0.67	0.66	0.74	0.30
Many women find it difficult to get their partners to use condoms, has this ever happened to you?	0.39	0.38	0.33	0.40
Religion -Zionist	0.25	0.27	0.21	0.46
Risk of becoming HIV infected - None	0.24	0.28	0.28	0.47
Do you live with the last person you had sex with?	0.55	0.59	0.53	0.49
Spruitview	0.05	0.03	0.04	0.51
HIV knowledge score	6.94	6.85	6.99	0.53
Crowding index (persons per bedroom)	2.29	2.25	2.19	0.57
Have you ever seen a female condom?	0.50	0.51	0.55	0.57
Household head - Self	0.17	0.18	0.14	0.61
Household head - Husband	0.46	0.50	0.49	0.64
Risk of becoming HIV infected - Medium	0.26	0.23	0.27	0.66
Owns home	0.43	0.43	0.46	0.69
The last time you had sex, was a condom used?	0.32	0.31	0.29	0.71
What proportion of the household expenses does your partner contribute?	4.07	3.99	4.01	0.80
Ethnicity - Zulu	0.51	0.51	0.52	0.95
How many children do you have?	1.83	1.79	1.81	0.96
Ethnicity - Sotho	0.24	0.23	0.23	0.98
N=	650	199	166	

From this analysis, we however, can identify the significant demographic variables to be included in our exploration of the determinants of directly elicited willingness to pay. However, since the asset index and access to social capital are part of the household socio-economic status variable, they will not be included together. Also, though locations Zonkiziswe and Vosloorus appear in the list of significant demographic variables, though they may indicate some kind of location fixed effect, they are of little use for drawing generalisable conclusions and will not be included.

10.6. Determinants of directly elicited willingness to pay

In this section determinants of respondents' willingness to pay values are explored to identify key socio-demographic characteristics. Of interest is what determines the relative values that women give to the different products (microbicide, diaphragm and the female condom), rather than to estimate the demand curve or changes in welfare by estimating consumer surplus, as is more frequently the aim of willingness to pay surveys (also known as contingent valuation surveys) [457-464, 390, 465-471].

10.6.1. The model specification

In 10.5. , an exploratory analysis of market segments and preferences was undertaken using principal components analysis. It suggested a number of key demographic factors that are likely to determine choices: household socio-economic status (seshh) and individual demographics (age (age), level of education (EducYrs), and employment status (employd), Years living in location (YrsinLoc)) and a number of behavioural characteristics: whether they had ever paid for condoms (PaidMCSCens); ever use of a female condom (FCEvUs), desire not to get pregnant (DontWantPreg), age at sexual debut[47] (SexDeb), the last time they used a condom if they had initiated condom use themselves (InitiateMC), if they are living with a sexual partner, and their self perceived risk of HIV (RiskHigh, RiskMed, RiskNo, relative to RiskLow). These will be the explored as variables in the analysis of determinants of WTP. In addition, we are interested in probing into the issue of how cohabitation (Cohab), the ability to use condoms (having ever experience difficulties negotiating condom use (DiffMC) and condom use at last sex act (MCLastS)) affect the WTP for the different products. Male condom ever use (MCEvrUse) is included to avoid the omitted variable bias.

[47] Of course this may not be a choice variable

$$WTP_{product} = f\left[\begin{array}{l} SES_{hh}, \text{Age, Education, Employment, Years living in location, Cohabitating,} \\ \text{Don't want pregnancy, Age at sexual debut, Male condom-ever used),} \\ \text{Male condom-paid for, Condom initiated-self, Female condom ever used,} \\ \text{Experienced difficulties getting a partner to use condom, Used condom last sex act,} \\ \text{Self perceived HIV risk.} \end{array}\right] \quad \textit{Eq. 10-1}$$

There are three main regression models used to estimate determinants of willingness to pay: ordinary least squares (OLS), Tobit, and interval regression (also called grouped data regression [454]). This section estimates and compares the results of these three models.

The models were first estimated in full (as above in Eq.10-1) in an initial exploratory analysis. These results are presented in Appendix Table A10-2. Stepwise regression was then used to obtain the most parsimonious model for each product with significant variables only. Stepwise regression was used with an entrance criterion of a p-value of 0.2 or less for each variable. This provides guidance on which variables are not significant in any of the different product regressions. The reduced model includes the following variables:

$$WTP_{product} = f\left[\begin{array}{l} SES_{hh}\text{ (seshh), Age (age), Employment (employd), Female condom ever used} \\ \text{(FCEvUs), Male condom-ever used (MCEvrUse), Male condom-paid for} \\ \text{(PaidMCSCens), Condom initiated-self (IntiatMCSCens), Cohabitating (Cohab),} \\ \text{Self perceived HIV risk- None (RiskNo).} \end{array}\right] \quad \textit{Eq. 10-2}$$

The full set of estimations can be found in Appendix Table A10-3. These are OLS and Tobit with the dependent variable in values, logarithms and logarithm (WTP+1), Tobit with those who stated they would not try a product being included in the sample with a WTP value of 0 rather than as a missing value, and the interval regression with the interval specified as 0 and as less than 0 to 0. Also in this appendix are the estimates of WTP for single use and reusable products. The payment scale questions were designed to get people accustomed to the presentation of the prices that would occur in the DCE; there was a set of prices (0-R20) for single use products (the female condom and microbicides) and a different set for the reusable diaphragm (0-R80). In the payment scale question, these values were for a generic single use or reusable product.

10.6.2. Model estimates of the determinants of willingness to pay

To gain some insights into which factors influence women's valuations (as measure through WTP) and their differences between the different barrier methods, the three reduced models (OLS, Tobit, Interval regression) are estimated for each product using the actual WTP values (Table 10-7). The estimates are then compared between products. However, it should

be noted that this does not formally test for differences in determinants of WTP among products. To do so would require estimation of a pooled model with dummy variables and interaction terms which allows testing for differences in intercepts and slopes between the products.

Table 10-7 Regression estimates of WTP for the diaphragm, microbicides, the female condom, using reduced OLS, TOBIT and Interval regression models

Reduced-OLS	**Diaphragm**		**Microbicide**		**Female condom**	
Values	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|
seshh	8.37	***<0.01***	4.30	***<0.01***	1.88	***<0.01***
age	-0.56	***0.03***	-0.51	***<0.01***	-0.31	***0.01***
employd	9.17	***0.04***	7.44	***0.01***	4.25	***0.01***
FCEvUs	-13.14	***0.07***	-5.16	0.13	-2.08	0.39
MCEvrUse	-4.57	0.3	4.73	***0.03***	0.33	0.86
PaidMCS	5.12	0.46	-1.51	0.74	-4.35	0.14
IntiatMCS	3.57	0.42	4.17	0.17	0.33	0.86
Cohab	6.16	***0.08***	4.31	***0.08***	-1.57	0.32
RiskNo	9.45	***0.07***	4.47	0.11	2.52	0.25
_cons	45.78	***<0.01***	23.23	***<0.01***	18.98	***<0.01***
n=	606		745		514	
r^2	0.07		0.08		0.04	
RESET p-value	0.03		<0.001		0.69	
Tobit	**Diaphragm**		**Microbicide**		**Female condom**	
	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|
seshh	9.98	***<0.01***	5.54	***<0.01***	2.37	***0.03***
age	-0.75	***0.02***	-0.61	***<0.01***	-0.49	***<0.01***
employd	9.72	***0.04***	8.72	***<0.01***	5.17	***0.02***
FCEvUs	-15.72	0.2	-6.73	0.38	-1.60	0.78
MCEvrUse	-5.12	0.33	5.78	***0.06***	1.18	0.65
PaidMCS	5.69	0.46	-2.18	0.6	-5.13	0.17
IntiatMCS	4.19	0.4	4.83	***0.09***	0.24	0.92
Cohab	6.49	0.14	4.30	***0.09***	-1.48	0.49
RiskNo	11.23	***0.02***	4.83	***0.07***	1.78	0.42
_cons	47.40	***<0.01***	21.07	***<0.01***	20.66	***<0.01***
n=	606		745		514	
pseudo-r^2	0.01		0.01		0.01	

Table 10-7 continued

Interval regression	Diaphragm		Microbicide		Female Condom	
When 0=[.,0]	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
seshh	8.76	***<0.01***	4.39	***<0.01***	2.11	***<0.01***
age	-0.75	***<0.01***	-0.35	***<0.01***	-0.35	***<0.01***
employd	7.91	***0.05***	4.13	***0.01***	3.48	***0.03***
FCEvUs	-12.67	0.18	-1.27	0.63	0.29	0.93
MCEvrUse	-2.21	0.61	3.55	***0.03***	0.50	0.77
PaidMCS	8.23	0.23	-2.25	0.63	-4.30	***0.07***
IntiatMCS	1.94	0.65	2.47	0.22	0.35	0.83
Cohab	5.68	0.12	1.69	***0.1***	-0.50	0.74
RiskNo	5.53	0.14	1.39	***0.1***	0.33	0.83
_cons	52.44	***<0.01***	20.12	***<0.01***	18.98	***<0.01***
n=	606		745		514	
pseudo R^2***	0.06		0.07		0.03	

* RESET p-value tests the Ho: that there are no omitted variables. This test is not available in Stata for TOBIT and interval regression models. *** pseudo R^2 is calculated as average of the correlations between the predicted values and the upper and lower limits of the intervals [472]

Seshh: household socio-economic status; **age**: age; **EducYrs** level of education; **employd**: employment status; **FCEvUs**: ever use of a female condom; **MCEvrUse**: male condom ever use; **PaidMCS**: whether they had ever paid for male condoms; **InitiateMC**: if they had initiated condom use themselves the last time they used a condom; **Cohab**: if they are living with a sexual partner. **DontWantPreg**: desire not to get pregnant; **SexDeb**: age at sexual debut; **RiskHigh**, **RiskMed**, **RiskNo**, relative to RiskLow their self perceived risk of HIV- high, medium, or none, relative to low; **DiffMC**: having ever experienced difficulties negotiating condom use; **MCLastS**: condom use at last sex act; **YrsinLoc**; Years living in location.

A number of variables maintain consistent signs and significance in the different models for all products. Household socio-economic status and if the women is employed are consistently positive and significant. This is important as it shows that WTP is related to a woman's ability to pay, consistent with economic theory, if, as expected, these products are normal goods. If this was not found we would have a strong basis to doubt the remaining estimates. Age is consistently negative and significant. This is also expected as younger women are generally expected to be quicker to adopt new technologies.

The estimated coefficients of the different models of WTP for the diaphragm maintain their signs, but do not remain consistently significant at conventional levels. In the OLS women who 'have ever used a female condom' (FCEvUs) have lower estimated WTP values for the diaphragm, and cohabitating (Cohab) women and women who consider themselves at no

risk of becoming HIV infected (RiskNo) show higher WTP values. With the exception of RiskNo in the Tobit model, all of the coefficients of these variables lose their significance in the Tobit and Interval regression models.

The estimated coefficients for the WTP for microbicides are more robust than those of the diaphragm. All three estimators show a positive and significant relationship between women's WTP for microbicides and 'having ever used a male condom' and for cohabitating. Having initiated condom use herself and considering herself at no HIV risk were both positive and significant in the Tobit and Interval regressions.

The reduced models do not appears to fit the WTP for a female condom data very well, the the only variable that was significant (other than the household socio-economic status variables) is having paid for a male condom, which is significantly negative; the R-squared was also consistently lower for this group. In the full models, the different self-perceived HIV risk categories appear to have an effect on WTP for the female condom, with women who consider themselves at High, Medium and No HIV risk, reporting lower values than women who consider themselves at Low risk (see Appendix 10). However, there is no further clear explanation for this result.

10.6.3. Comparison of determinants for the different products

Comparison between the three products show that the signs of: household socio-economic status, employed, age, initiated male condom use self, and considering oneself at no risk of HIV are the same for all products. There were a number of interesting differences. The diaphragm has a negative sign for ever male condom use, while microbicides and the female condom have consistently positive signs. This suggests that those women who have never used a condom before value the diaphragm higher than women who have, while women who have used a condom before value microbicides and the female condom higher than women who have never used on.

The most interesting difference between women's valuation of the products is the difference in sign between cohabitating and non-cohabitating women: for the female condom *cohab* is negative and highly insignificant, and for the diaphragm *cohab* is positive and significant in the OLS model and just insignificant if using a p-value cut-off of 10% in the Tobit ($p=0.14$) and interval regression ($p=0.12$), respectively and for microbicides it is significant and positive in all models. This suggests that cohabitating women value the more discreet products (diaphragm and the microbicides) more than non-cohabitating women, but that

there is no difference in their valuations of the female condom, which cannot be used in secret. These conclusions remain largely intact under alternative model specifications and removal of outliers (Appendix 10).

10.7. Discussion

In this chapter, women's directly elicited preferences have been presented and suggest that women were most willing to try microbicides, followed by the diaphragm, and then the female condom. There appeared to be good comprehension of the presentation of the effectiveness concepts, both around HIV and pregnancy prevention.

The analysis of potential market segments that allow for identification of some key differences in socio-demographic and 'behavioural' characteristics identified three groups of women with different product and distribution preference. When examining their characteristics, there appear to be a central large group of 'average' women. The two smaller clusters represent a less empowered poorer group of women and more empowered better off group of women.

Section 10.6.2 used the willingness to pay values to draw conclusions about differences and similarities of preferences between the three women's barrier products. As expected, socio-economic status was consistently shown to influence the monetary values given, reflecting higher willingness to pay values by women with higher abilities to pay. Younger women were willing to pay more than older women for all products. The key differences in women's valuations between the products were between cohabitating and non-cohabitating women: cohabitating women had higher values for the discreet products (microbicides and diaphragm) but not for the female condom, which can never be used without a partner's participation. The next chapter analyses women's preferences for the product attributes elicited through the discrete choice experiment.

Chapter 11. Analysis of a DCE 1: preferences for physical attributes

11.1. Introduction to the DCEs

Policymakers and academics have raised the possibility that introducing new barrier methods for human immunodeficiency virus (HIV) prevention could lead to the substitution of condoms for potentially less effective microbicides [473, 162, 474, 475]. This chapter explores how preferences for products and their attributes vary by women's risk/need profiles and looks at which women are most likely to change from what they did last time they had sex. This allows exploration of how different groups of women may react to different types of products, more specifically how.

More specifically, indirect preference for products and distribution strategies are explored to answer the following questions:

- What are women's preferences for barrier methods and their attributes?
- How do women's preferences for the new products vary by their own characteristics and situations?
- How is uptake of new products likely to differ by:
    - a woman's current capacity to protect herself
    - having had difficulties using condoms in the past
    - living with her partner?

The general methods of the analyses are described in Section 11.2. A description of the women's choices is provided in 11.3. Women's preferences for physical attributes are presented in 11.4. The last section discusses results.

11.2. Methods: estimation approach and model specification

11.2.1. The model

The general theoretical model has been presented in Chapter 4. In this section we present the specific estimation approach and model.

The outputs of the discrete choice models are relative utilities. The simplest form of the models incorporate only product attributes in the utility function. The way in which

preferences for the products and their attributes vary among women can be explored by including interactions with women's socio-demographic characteristics (SDC).

The utility functions of main effects for the existing methods (no barrier method or male condom (MCLastS)), $V_{not\ switch-main}$, and the new barrier methods, $V_{new-main}$, are:

$$V_{not\ switch-main} = \beta_{NoChange} * NoChange + \beta_{MCLast} * MCLast$$

$$V_{new-main} = \beta_{dgm} * DGM + \beta_{mcd} * MCD + (-1 * (\beta_{dgm} + \beta_{mcd}) * FEMC) + \beta_{secr} * SECR + \beta_{preg} * PREG + \beta_{HIV} * HIV + \beta_{\ln(price)} * LN(PRICE)$$

It is hypothesised that:

- the choice to switch to any of the new barrier methods could be affected by the utility of their current practice (use of a male condom in last sex act (MCLastS)), having had difficulties using a male condom in the past (DiffMC), cohabiting (Cohab).

$$V_{not\ switch-SDC} = V_{not\ switch-main} + \beta_{DiffMC} * DiffMC + \beta_{Cohab9} * Cohab$$

It is hypothesised that the preference for:

- products is different for women who used a condom relative to those who did not (DGM_MCLastS, MDC_MCLastS , FEMC_MCLastS),
- being able to use a product in secret or not is different for women who had and had not experienced difficulties using a male condom in the past (SECR_DiffMC103)
- pregnancy prevention effectiveness is different for women who are living with their partners (PRG_Cohab) than those who are not because of their life stage/circumstances relating to the consequence (positive or negative) of conception.
- HIV prevention effectiveness is different for women who consider themselves at higher risks of becoming HIV infected (HIVRISK).
- HIV prevention effectiveness is different for women who are cohabiting (HIV_Cohab).

$$V_{new-SDC} = V_{new-main} + \beta_{DGM\_MCLastS} * (DGM\_MCLastS) + \beta_{MCD\_MCLastS} * (MCD\_MCLastS) + (-1 * (\beta_{DGM\_MCLastS} + \beta_{MCD\_MCLastS}) * FEMC) + \beta_{secr103} * SECR\_DiffMC + \beta_{PRG\_Cohab} * PRG\_Cohab + \beta_{PRG\_Cohab} * PRG\_Cohab + \beta_{HIVrisk} * RISKHIV + \beta_{HIV\_Cohab} * (HIV\_Cohab)$$

For generic experiments such as these, adding SDC will quickly expand the number of variables that need to be estimated and thus the degrees of freedom. This is because each SDC included results in adding a cross-product of the SDC with the attribute variables to obtain an estimate of how the SDC changes women's' preferences for a specific attribute.

In the next sub-section the appropriate functional form for price and pregnancy is explored, then the appropriateness of the NL versus MNL models is tested. The hypotheses above are tested in 11.4. [48]. LIMDEP 8.0/NLOGIT 3.0 was used for estimation.

11.2.2. Model specification 1: functional forms for price and pregnancy

This section aims to test the appropriate functional form of price and pregnancy effectiveness, specifically to:

1 test if the price attribute is better represented by 'partworths', which allow for a non-linear response to changes in price, or if a continuous linear variable suffices.
2 test if the linear specification of pregnancy represents preferences correctly: i.e. That 'No pregnancy prevention' is not preferred to some medium levels;

Functional form of price

There are a number of different functional forms the price variable may take. These are presented in Table 11-1.

Table 11-1 Potential functional forms of price

Partworths by price level	Free	Low	Medium	High
Partworths by price values – female condom & microbicide	0	5	10	20
- diaphragm			40	80
Price values in Rand – female condom and microbicide	0	5	10	20
-diaphragm	0	20	40	80
Price values in Ln(Rand+1) – female condom & microbicide	0	1.792	2.398	3.045
-diaphragm	0	3.045	3.714	4.394
Linear transformation: price/ 5 and price/ 20, respectively	0	1	2	4
Ordinal values for categories	0	1	2	3

[48] In addition, an RPL model was estimated but did not prove more appropriate than the current models have therefore not been presented in the main body of the text. For the RPL estimates and a brief discussion, see Appendix 12.

The marginal utility may not be consistently decreasing. As mentioned above there is much talk of the distrust of free products. This can be tested by specifying the different prices as categorical variables (partworths), using either dummy variable coding or effects coding. This could be a 4-level categorical variable (free, low, medium, high), or a 6-level categorical variable for each Rand value. These could be in natural units (Rands). Economic theory tells us that there is a decreasing marginal utility of money. This suggests a non-linear but decreasing response to price. A number of functional forms would allow for this. Commonly used is a logarithmic transformation. However, as 0 Rand is also one of the levels, and we cannot take the log of 0, 1 is added to all values. This could also be taken into account by a transformation such as dividing the prices by 5 for the disposable products (female condom and microbicide) and 20 for the reusable diaphragm (generating codes: 0,1,2,4), or using ordinal values (0,1,2,3).

Table 11-2 Testing for functional forms for price and pregnancy

	1 MNL simple		2 NL simple		3 NL simple - price partworths		4 NL simple - pregnancy effectiveness partworths	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
DG2	0.085	0.03	0.140	<0.01	0.128	0.02	0.0723	0.08
MD2	0.226	<0.01	0.256	<0.01	0.248	<0.01	0.289	<0.01
FEMC	-0.311	<0.01	-0.396	<0.01	-0.376			
SECR	0.043	0.10	0.047	0.14	0.050	0.12	0.051	0.11
HIV	3.397	<0.01	4.305	<0.01	4.284	<0.01	4.290	<0.01
PRG	1.187	<0.01	1.375	<0.01	1.427	<0.01		
PRG0%							- 0.699	<0.01
PRG55%							- 0.110	0.02
PRG75%							0.257	<0.01
PRG95%							0.552	
PRICE	-0.007	<0.01	-0.009	<0.01			- 0.134	<0.01
P=R5					-0.092	0.23		
P=R10					-0.214	<0.01		
P=R20					-0.424	<0.01		
P=R40					-0.731	<0.01		
P=R80					-0.556	<0.01		
C	3.043	<0.01	0.712	<0.01	0.646	<0.01	0.3653	0.03
C*McLastS	0.690	<0.01	0.660	<0.01	0.660	<0.01	0.6602	<0.01
Inclusive value								
SWITCH			0.338	<0.01	0.329	<0.01	0.3276	<0.01
NOSWITCH			1.000	-	1	0	1	0
LL	-5680		-5606.4		-5593.5		-5596.1	
n	6,101		6,101		6,101		6,101	
Adj. pseudo R-2*	0.141		0.152		0.1537		.1534	

*Based on current model over a constants only model

Figure 11-1 shows the estimates of changes in utility at the prices in the data (0-80 Rand) generated from a simple nested logit model. The broken straight line shows a linear specification, the unbroken pointed line shows a partworth specification by price values (using dummy coding not effects coding), and the smooth unbroken curve is the logarithmic specification. Partworths for R5 and R10 are based only on values occurring for microbicides and the female condom. Partworths for R40 and R80 are based only on values occurring only for the diaphragm. It appears that the partworth values show a stronger disutility for price than the linear specification. The value of p=40 in the partworth specification shows an unexpected value, having a lower utility than the higher price of 80. This goes against economic theory. Interestingly, at p=80, the functional forms predict very similar relative utilities.

We can also use the LR test to test between the linear and partworth model. The linear functional form is the restricted model and the partworth functional form the unrestricted model: -2*[LLr-LLur] =-2*[-5606.4- -5593.5]=22.2 with a $\chi 2$ distribution with 3 degrees of freedom (number of additional parameters). This shows that we can reject the hypothesis that there is a linear response to price.

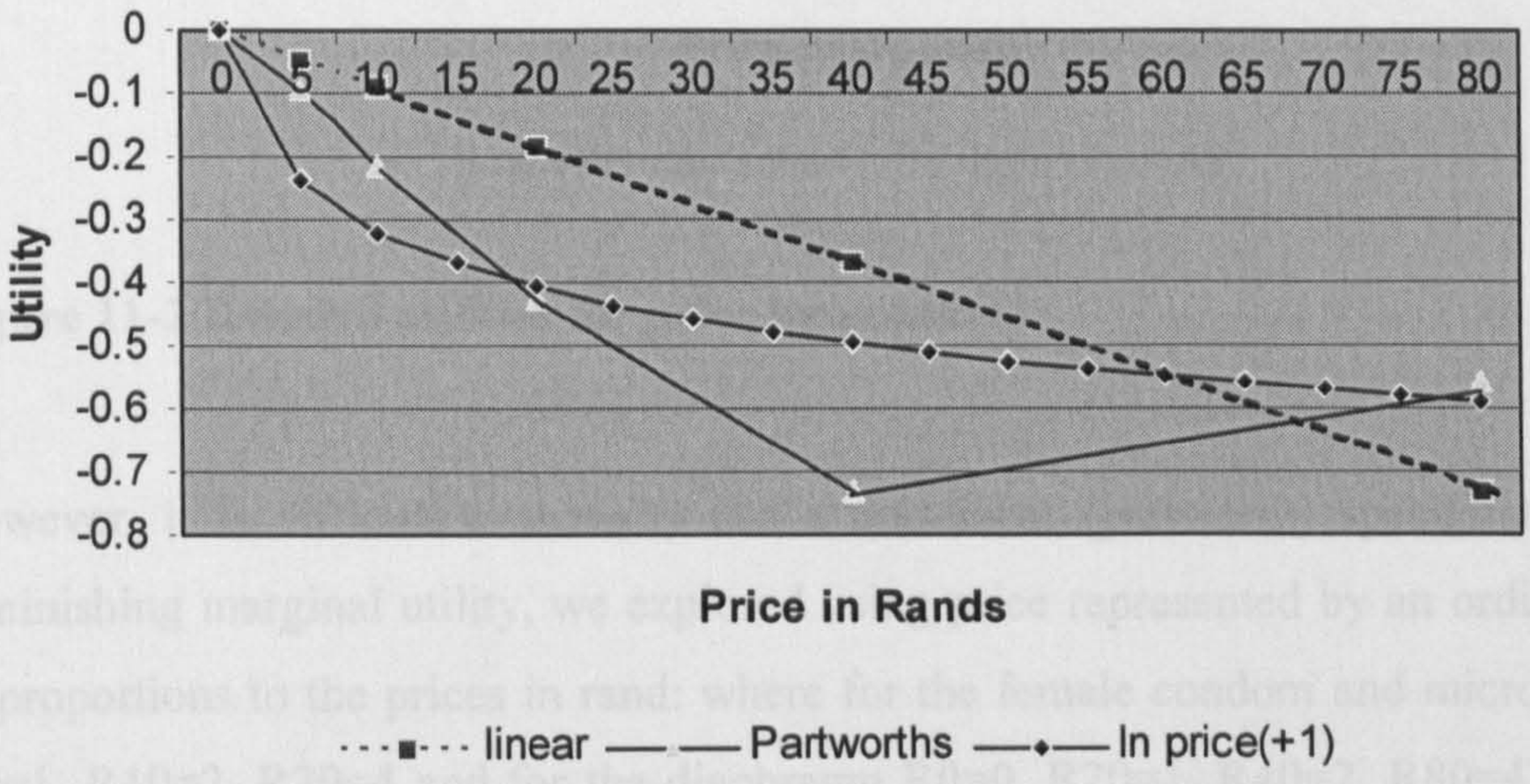


Figure 11-1 Price, linear versus partworth specification

An alternative way to specify price is categorically. Figure 11-2 shows the relative utilities of price by product. Using effects coding, these are relative preferences. The prices represented by Free, Low, Medium and High for the female condom and microbicides are 0, R5, R10, R20; for the diaphragm they are 0, R20, R40, R80. The price attribute was designed to account for the reusability of the diaphragm. The diaphragm shows the dip in utility at medium price (R40) seen above. The expected very negative utility of something price at R80 is not seen. In fact it has a higher utility than a R20 female condom. Microbicides have a peak in utility at R10, rather than free or low as expected. It is only the female condom that is showing a consistently negative curve that is predicted by economic theory. In fact this figure shows that the greatest disparity in utility between the products is at medium price, otherwise they are fairly close together. This could suggest that high has similar utilities be it for the diaphragm with the high price of R80 or for the microbicide or female condom with the high price of R20. The thicker line is for all products together, and interestingly shows a remarkably linear relationship.

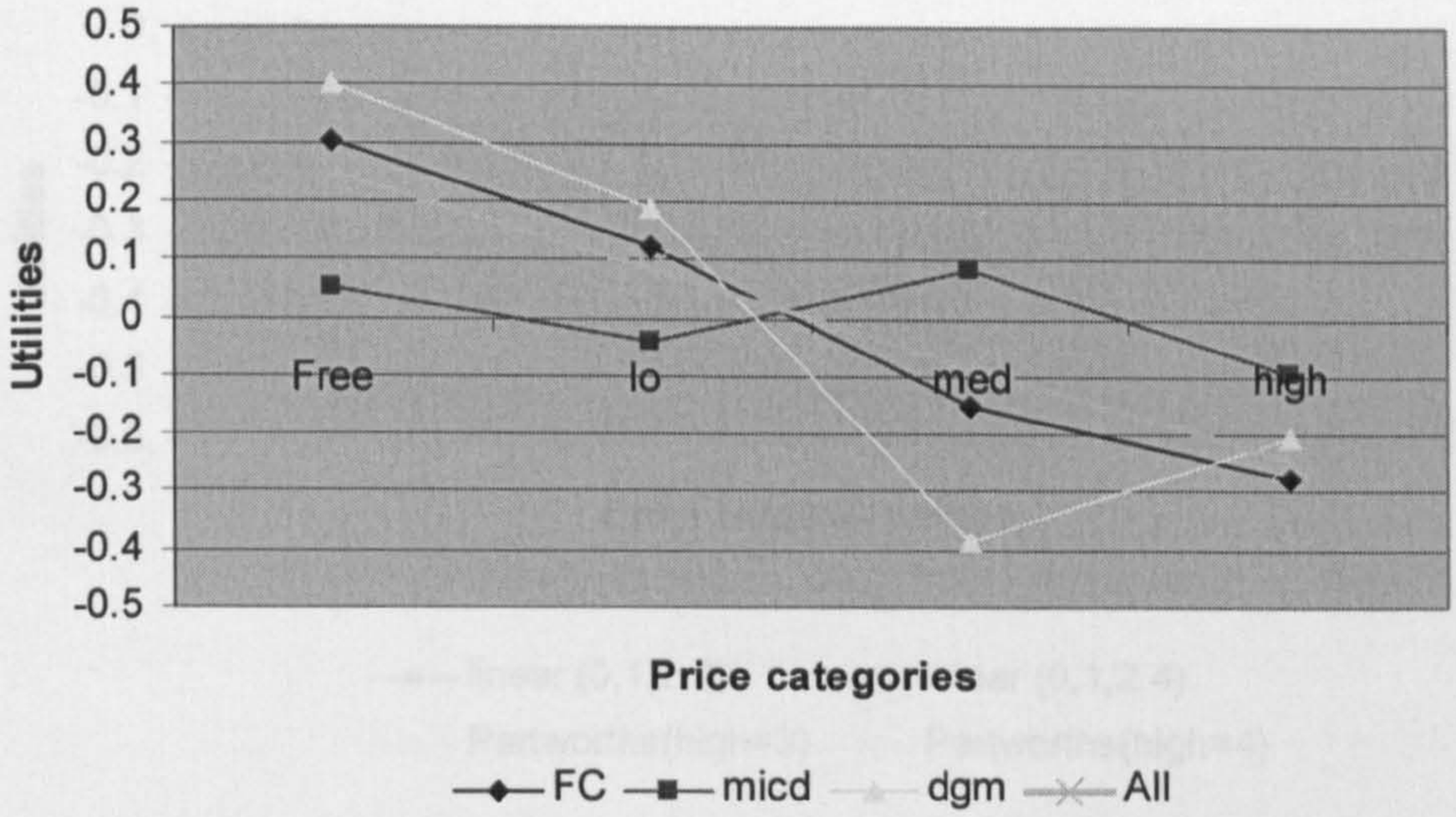


Figure 11-2 Relative utilities for price by product

However, it is difficult to actually use a non-linear (partworth) specification. So given diminishing marginal utility, we explored using price represented by an ordinal scale: first in proportions to the prices in rand: where for the female condom and microbicides R0=0, R5=1, R10=2, R20=4 and for the diaphragm R0=0, R20=1, R40=2, R80=4 (the pink line with square markers). And for a more simple ordinal scale of 0,1,2,3 for free, low, medium and high (the yellow line with triangles) (Figure 11-3). Then we compare the slope of these with the slope of the partworths. The continuous linear function using 0,1,2,3 values leads to estimates with almost exactly the same utility values as when unrestricted using partworths for all products together (the dark line mostly behind the light (yellow) line). This suggests this would be a good functional form with which to estimate price as a linear function. However, this makes retrieval of relative WTP values quite complicated with the X's taking on different values depending on the product.

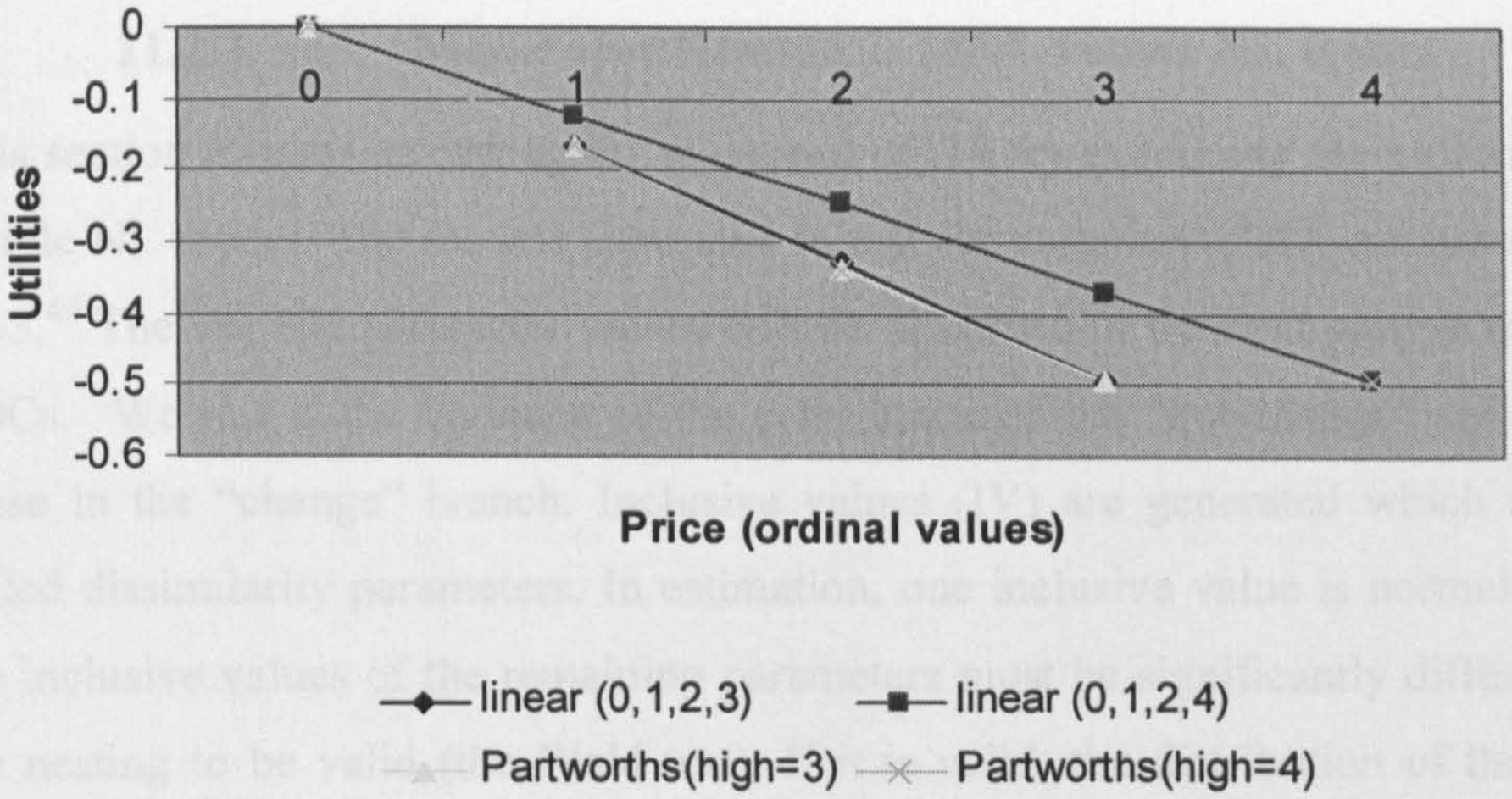


Figure 11-3 Price ordinal value specification

The functional form of the price variable is important as it affects some of the key outcomes such as potential WTP values and price elasticity of demand.

Pregnancy functional form

This analysis aims to understand if no pregnancy prevention better than some intermediate levels of pregnancy prevention? Model 4 in Table 11-2 shows the partworth coefficients. Pregnancy effectiveness =0 is not larger than any of the other coefficients for pregnancy effectiveness. Effects coded partworths impose the mean at 0, while the linear specification imposes 0 at 0%, otherwise their slopes are almost identical. We will therefore use a linear specification for pregnancy effectiveness.

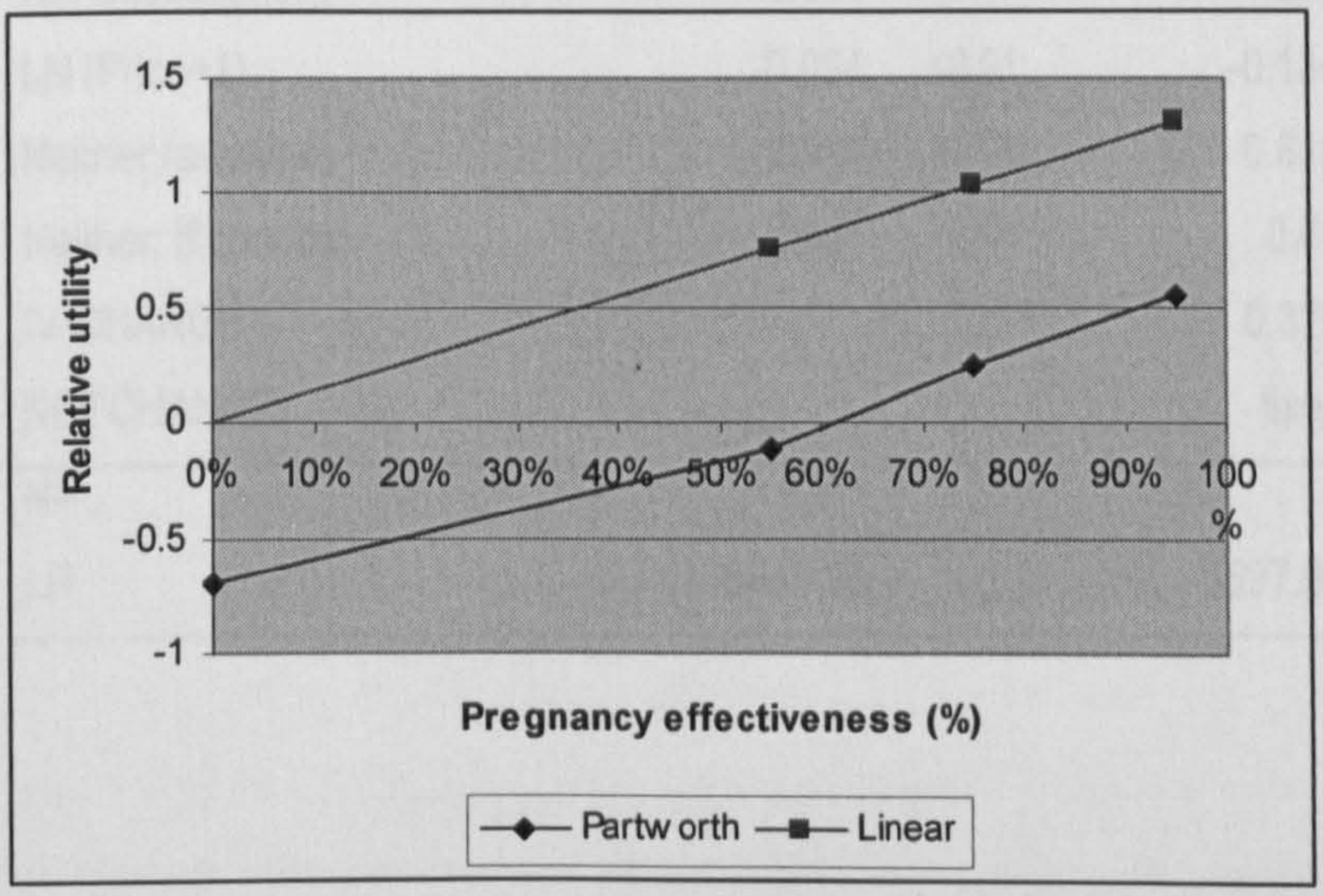


Figure 11-4 Relative utilities for pregnancy, linear and partworth specification

11.2.3. Model specification 2: MNL versus NL model

This section focuses on testing for violations of IIA by examining the inclusive values in a simple NL model. The models estimated to test for violation of IIA are presented in Table 11-3.[49] The specific parameter values will be discussed in the next section in a model with SDCs. We test if the variance of the error terms of the "not-change" option is different those in the "change" branch. Inclusive values (IV) are generated which are sometimes called dissimilarity parameters. In estimation, one inclusive value is normalised to 1, then the inclusive values of the remaining parameters must be significantly different from 1 for the nesting to be valid (the Wald test). If it is valid, the distribution of the error term is significantly different from those of the normalised branch. Here the IV of 'Not-change' is set to 1. If IVs for 'Change' is significantly different from 1, the branch is valid and the error structure of A and B are different from C.

Table 11-3 Estimation of preferences for barrier methods and their attributes: MNL and NL without interactions.

	MNL		NL	
	Coeff.	p-value	Coeff.	p-value
Diaphragm	0.019	0.58	0.058	0.15
Microbicide	0.255	<0.01	0.283	<0.01
Female Condom	-0.274	<0.01	-0.341	<0.01
Secrecy	0.041	0.11	0.051	0.11
Pregnancy effectiveness	1.177	<0.01	1.366	<0.01
HIV effectiveness	3.370	<0.01	4.290	<0.01
LN (Price+1)	-0.094	<0.01	-0.134	<0.01
Neither (average)	2.942	<0.01	0.615	<0.01
Neither: If condom	0.691	<0.01	0.66	<0.01
IV-CHANGE			0.327	<0.01
NOTCHANGE			fixed	
N=	6101			
LR	-5676.65		-5597.96	

[49] Violations of IIA are also tested using a random parameters logit model with correlations. These estimates are shown in Appendix 12. Such a specification allows for identifying attributes with correlated preferences. However, as this is not able to feed into product development, it is not further explored.

We find that the parameters for CHANGE are significantly different from 1. This means that the two levels are valid. If the IV was not significantly different from 1, the model would have collapsed into a single level (equivalent to the MNL model).

The other test that could be applied is the likelihood ratio test. The MNL model is a restricted form of the NL model. The computed test statistic for this is $-2*[-5676.65--5597.96]=157.38$ which has a chi-squared distribution with 2 degrees of freedom, which has a p-value of less than 0.01. Again we are justified in rejecting the hypothesis that the NL model is not an improvement to the MNL model. From here onwards the analyses and interpretation will all relate to the NL model.

Here, the nested logit model will only be applied to the physical attributes DCE, because the distribution attributes DCE has only two choices and can therefore not be partitioned. Generally, the final tree structure is found through trial and error in the search for the lowest log-likelihood at convergence. However, in this application there should be no difference in the variance of the error term between A and B as they are designed to be exactly the same, but C represents different attributes and levels (i.e. condom and no condom). Although the NL is designed purely to accommodate violations of IIA, it is not designed to model the decision making processes, and in this application these are closely linked. Therefore, there will be no exploration of the tree structure. The structure to be tested is depicted in Figure 4-2.

11.3. Descriptive analysis of choices

Table 11-4 provides an overview of the choices made according to women's characteristics that are hypothesised to have an effect on women's choice behaviour. Each woman was given six choice sets with three alternatives. Of the 6101 choices possible[50], if left to chance, two-thirds would have been to change and one-third would have been not to change. Seventy-four percent of choices were in favour of a new barrier method, 26% were for what the person did last time. Of the responses by women who had not used a condom in their last sex act, only 17% opted to 'not change'. Of responses by women who had used a male condom in their last sex act, 44% were 'Not change' (which meant use a male condom). Women who used a male condom were less likely to change to one of the new barrier methods: in 56% of choices they chose one of the new barrier methods versus 83% of women who did not use protection. This suggests that preferences for the new barrier

[50] 6 choice sets*1017 women and 1 missing response

methods are likely to differ between women who were and were not able to use a male condom in their last sex act. Other groups of women whose choice to change was 80% or higher were: those currently using contraceptives (80%), those who experienced difficulties using condoms (82%), and those who perceive themselves at high risk of HIV.

Table 11-4 Switching responses by women's characteristics

		Change		Not-change	
		Count	%	Count	%
All		4,539	74%	1562	26%
Condom used at last sex act (MCLastS)	No	3,466	83%	727	17%
	Yes	1,073	56%	835	44%
Cohabiting with sexual partner (Cohab)	No	1,926	70%	810	30%
	Yes	2,613	78%	746	22%
Ever experienced difficulties getting	No	2,624	69%	1156	31%
partner to use condoms (DiffMC)	Yes	1,890	82%	401	18%
Employed (emplyd)	No	2,902	73%	1058	27%
	Yes	1,637	76%	504	24%
Self-perceived risk of HIV* (RiskH)	High	1,105	83%	232	17%
(RiskM)	Medium	1,198	77%	362	23%
(RiskL)	Low	1,043	74%	361	26%
(RiskNo)	None	1,019	65%	547	35%
		Means		Means	
Household SES (SEShh)		-0.006		0.018	
Age (age)		31.86		30.58	
Years of education (EducYrs)		10.00		10.14	

* Risk is an ordinal variable that we will be using as cardinal in the model estimates, valued as 0 for No risk to 3 for High Risk. This functional form was chosen by model fit and consistency of parameters with theoretical expectations.
** The original variable was ordinal in terms of level of education attended and completed. This was transformed into an average number of years in education to obtain a continuous variable, however this represents more an interval.

An overview of these characteristics, their coding and the descriptive statistics for the participants can be found in Appendix Table A11-1. Correlations of these variables are presented in Table A11-2. This has provided a general description of the choice data. The following section will describe the estimation procedures.

11.4. Estimation results

Table 11-5 shows the results of the MNL and NL models with interactions. The non-interacted variables allow for the testing of the importance of products and their attributes in women's choices. The interacted terms test for differences in women's preferences by women's socio-demographic characteristics.

Table 11-5 Estimation of determinants of preferences for barrier methods for HIV prevention and their attributes with interactions

	MNL Coeff.	NL Coeff.
Diaphragm (DGM)	0.071 *	0.126 ***
Microbicide (MCD)	0.235 ***	0.257 ***
Female condom (FEMC)†	-0.307 ***	-0.383 ***
Ability to use in secret (SECR)	0.064 **	0.071 **
Pregnancy efficacy (PRG)	1.195 ***	1.383 ***
HIV efficacy (HIV)	3.016 ***	3.605 ***
LN(Price) (LNP)	-0.086 ***	-0.121 ***
DGM*Used condom last sex act (MCLastS)	0.125 ***	0.146 ***
MCD*MCLastS	-0.047	-0.048
FEMC*MCLastS	-0.079 **	-0.098 **
SECR*ever difficulties negotiating condoms (DiffMC)	0.092 ***	0.101 ***
PRG* cohabiting	-0.091	-0.144
HIV* self perceived risk of HIV	0.290 ***	0.496 ***
HIV*Cohab	-0.157	-0.334 **
LNP*employed (EMP)	0.037 ***	0.044 ***
Choose 'do the same as last time' (C) (NOSWITCH)	2.859 ***	0.904 ***
C*MCLastS	0.633 ***	0.614 ***
C*DiffMC	-0.268 ***	-0.251 ***
C*Cohab	-0.165 *	-0.136 **
Inclusive values –Change		0.412 ***
Not Change		1.000 ***
n	6065	
Llfunction	-5555.18	-5490.54

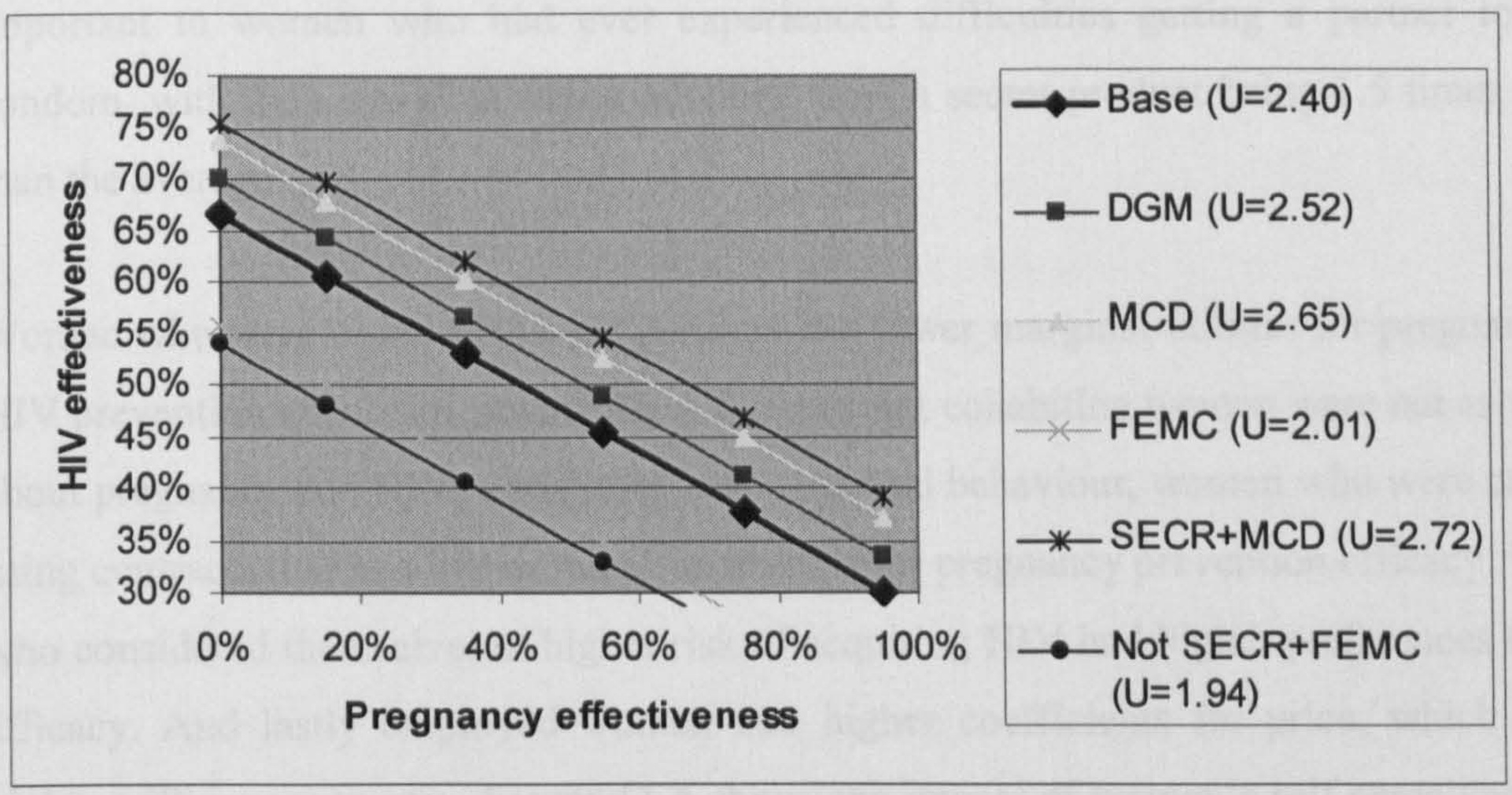
* is significant at a P-value<0.1. ** is significant at a P-value<0.05. *** is significant at a P-value<0.01.

†retrieved parameter by swapping the omitted category.

11.4.1. Main effects

Of the different products, the microbicide has the highest relative utility (.257) and female condom the lowest (-.383). These results are consistent with a priori expectations and the

directly elicited preferences for products, where microbicides appear most popular, followed by the diaphragm. Secrecy has a significant but small effect on choice probability. HIV effectiveness has a very large marginal effect: for 1 percentage point increase in HIV effectiveness an increased utility of (3.605/100 percentage points=) 0.036 is predicted. The levels used have differences of 20% points, so this would translate into an increase in utility of 0.72 for each level of increased effectiveness. Effectiveness in preventing pregnancy is also important with a coefficient of 1.383. This translates into an increased utility of 0.28 for each 20% increase in pregnancy effectiveness. The highest utility obtainable from these new products would be from: a microbicide that is usable in secret with 95% efficacy in preventing pregnancy and 95% efficacy in preventing HIV provided for free. This would provide a relative utility of 5.07. The least attractive feasible alternative would also be a microbicide, but one which cannot be used in secret, has 0% efficacy in preventing pregnancy and 35% efficacy against HIV and is sold at R20 (relative utility 1.08). Although the diaphragm and the female condom have lower product attributed valuations, they are restricted to 75% and 95% effectiveness against pregnancy and HIV, and thus putting a floor on the relative utilities associated with them.



DGM: Diaphragm; MCD: microbicide; FEMC: female condom; SECR+MCD: usable in secret and a microbicide; Not SECR+FEMC: not usable in secret and female condom

Figure 11-5 Effectiveness trade-offs

Figure 11-5 shows the trade-off between different levels of product effectiveness against pregnancy and HIV. The slope of the lines shows the marginal rate of substitution between HIV effectiveness and pregnancy effectiveness. This is the ratio of their coefficients (=3.605/1.383 = -2.61). The base line shows the average for all products. If it was a diaphragm, relative utility would be 0.12 higher (=2.52), if it was a microbicide, relative

utility would be higher still (2.65). As we saw above the female condom is least preferred with a relative utility of 2.01. If the microbicides were usable in secret, the marginal utility would increase by 0.07, and if the female condom was not usable in secret (as in reality), its relative utility would be just 1.94. The lines are linear as we have not allowed for increasing or decreasing marginal utilities or synergies (interactions) between HIV and pregnancy effectiveness.

11.4.2. Interactions

A number of interactions are included to explore the effect of women's characteristics on their product valuations (Table 11-5). Firstly, we examine how women's values for these products are affected by their current HIV prevention options/choices[51]. The effect of having used a condom in their last sex act ('MCLastS') has an opposite effect on women's marginal valuations of the female condom and the diaphragm. Women who used a condom last time have higher marginal valuations of the diaphragm than women who did not use a condom, and women who used a condom had lower marginal valuations of the female condom than women who had not. As may be expected secrecy was significantly more important to women who had ever experienced difficulties getting a partner to use a condom, with their marginal utility obtained from a secret product being 1.5 times greater than the average.

Women who were living with their partners had lower marginal utilities for pregnancy and HIV prevention efficacies, potentially reflecting that cohabiting women were not as worried about pregnancy and HIV. Consistent with observed behaviour, women who were currently using contraception had higher marginal utilities for pregnancy prevention efficacy. Women who considered themselves at higher risk of acquiring HIV had higher preferences for HIV efficacy. And lastly employed women had higher coefficients for price, which implies higher willingness to pay. Figure 11-6 shows the impact of women's self perceived risk of HIV and their cohabitation status on their marginal valuations of HIV effectiveness. Women who were both not cohabiting and who perceived themselves at high risk of acquiring HIV valued HIV effectiveness the highest, 66% higher than women who were cohabiting and perceived themselves at no risk of HIV (Figure 11-6).

[51] Having used a condom in the last sex act implies using a condom is a feasible option, however having not used one may mean that it is not an option or that it is an option but the choice was not to use one.

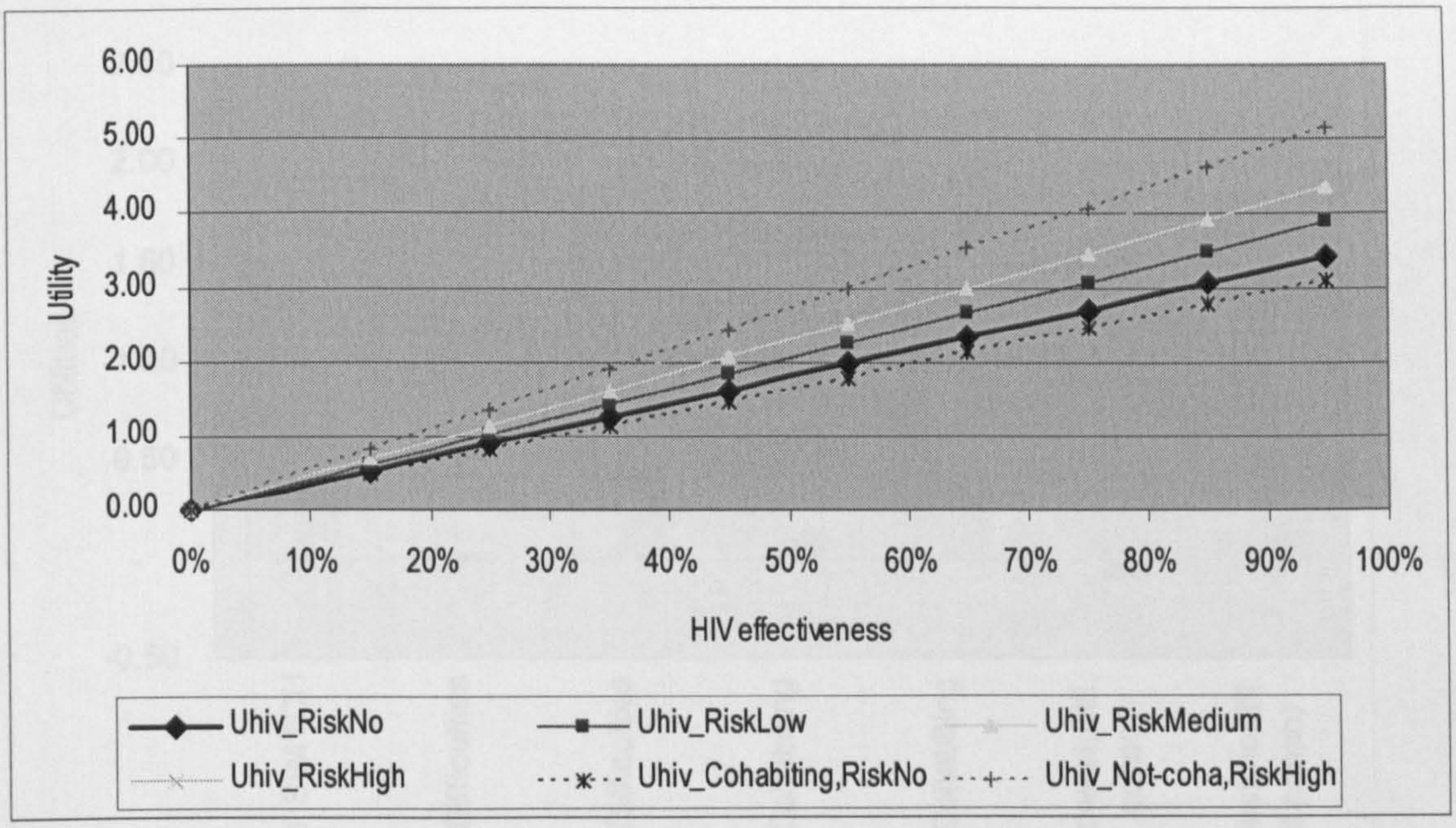


Figure 11-6 Utilities for HIV prevention effectiveness by women's self perceived risk of HIV and cohabitation status

11.4.3. The choice to not switch

The following section interprets the NL results in Table 11-5. The choice to switch from what a woman did last time she had sex represents either newly protected sex acts, if the woman had not used a condom in her last sex act, or it represents substitution away from the condom, if she had used a condom. The value of not switching is allowed to differ if the last sex act was or was not protected by a condom. If the woman used a condom, her relative utility is C+C_MCLastS, and if she did not it is C-C_MCLastS. There appears to also be high utilities related to not changing (.904) especially for women who used a condom in their last sex act (1.518). For women who did not use a condom, the relative utility is 0.29. Having had difficulties in negotiating condoms (DiffMC), living with a partner (Cohab), and currently using contraceptives (Contr) decreases the relative utility of not-changing and thus also its probability. A woman with these characteristics and who did not use a condom in their last sex act is predicted to have a relative utility of -0.34. In contrast, a single woman, who has never had a problem using condoms, and indeed used one in the last sex act and is not using contraception has a relative utility of 1.96. These are shown in Figure 11-7.

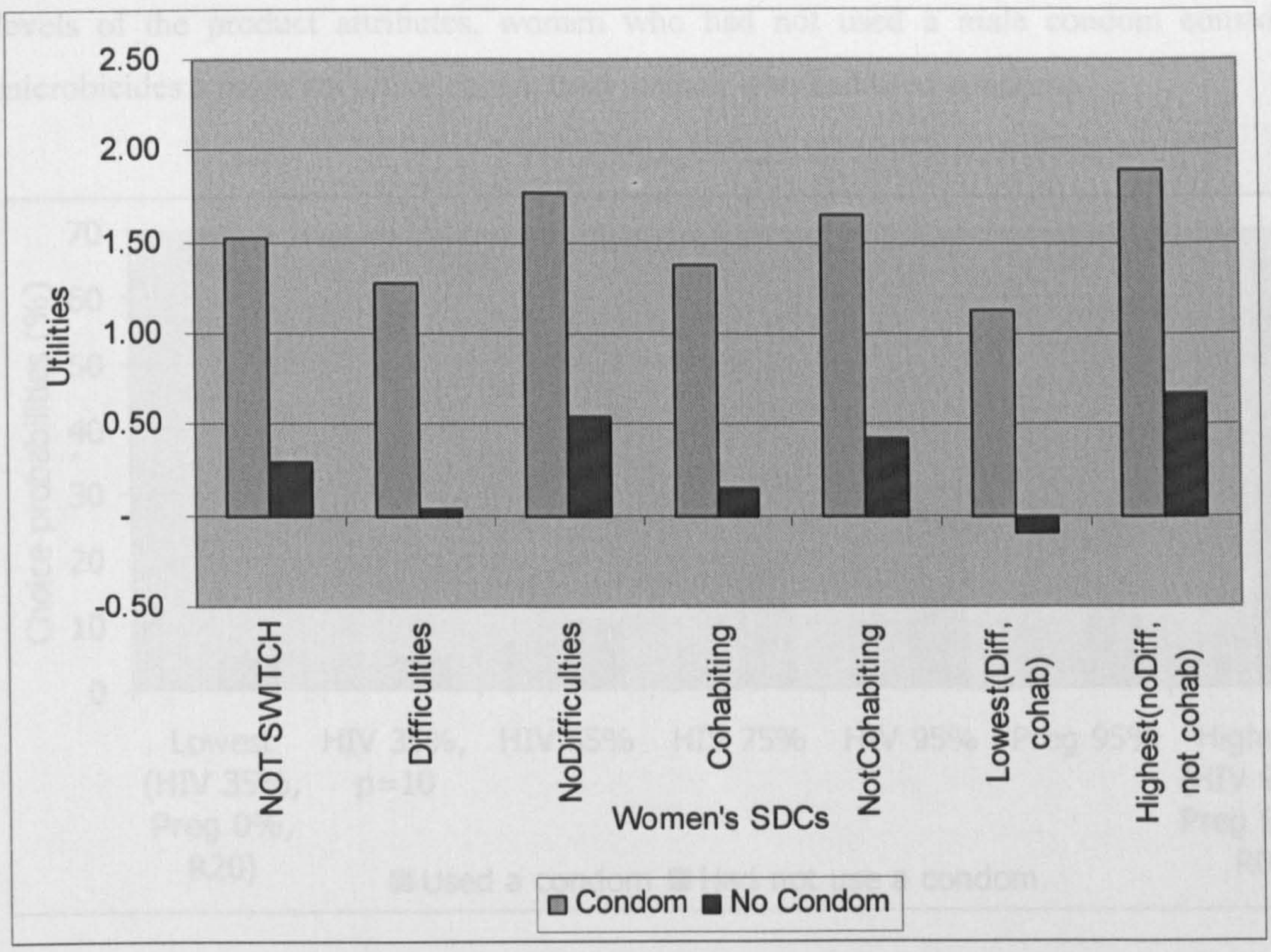


Figure 11-7 Relative utilities for not switching to a new barrier method from having used a condom or not having used a condom by women's SDCs

Figure 11-8 shows the probability of switching to a microbicide with different levels of HIV efficacy, pregnancy efficacy and price, according to whether she had used a condom or not in her last sex act. The choice is between the microbicide and a female condom sold at 10 Rand or Neither. The light bars on the left are the probabilities for women who reported having used a condom in their last sex act and on the darker bars on the right are the probabilities for women who had not used a condom in their last sex act. On the very left it can be seen that an expensive microbicide with low prevention efficacy would have a low probability of being chosen. As the product characteristics improve (towards the right of the figure), women find the product becomes more and more attractive relative to the female condom or what they did last time.

From these choice probabilities, it can be seen that the HIV effectiveness of product clearly played an important role in women's choices, with a low projected uptake of microbicide with poor effectiveness. Pregnancy prevention was also important to women and would enhance the attractiveness of a microbicide and facilitate its use. This shows that th e effectiveness of microbicides will be a major determinant of their uptake by women. For all

levels of the product attributes, women who had not used a male condom considered microbicides a more attractive choice than women who had used condoms.

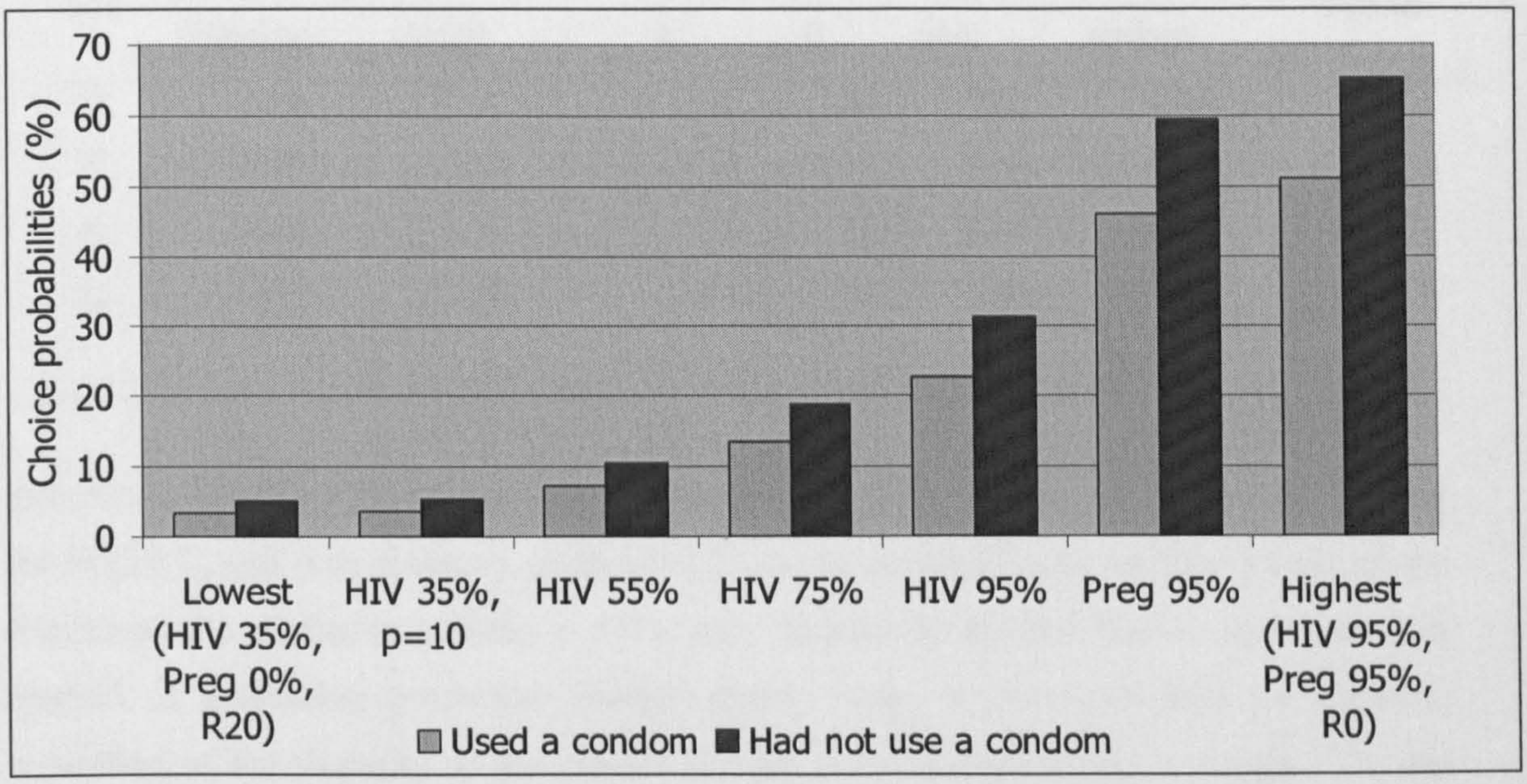


Figure 11-8 Probability of choosing a microbicide with different characteristics over a female condom or neither for women who had and had not used a condom in their last sex act.

11.4.4. Comparison between the NL and MNL

Both the simple model (Table 11-3) and the model with SDC interactions (Table 11-5) show fairly similar results to the MNL models in the same tables, maintaining the ordering of relative preferences. The major difference is in the coefficient for Neither (C). In MNL with SDC interactions this is 2.806 and in NL it is 0.810. In addition, the coefficients of the interactions with HIV (HIVRISK and HIV_Cohab) in the NL model are almost twice as large as those in the NL. This shows that the MNL is relatively robust to the violations of IIA, if the interest is merely in identifying influential factors and their relative importance.

11.4.5. Predictive validity

Predictive validity can be explored by analysing the responses to the hold-out questions. This is done using the percentage of correctly predicted responses (here done using the simple model with no interactions) and are presented in Table 11-6.

Table 11-6 Predictive validity

Choice sets	Predicted		Observed			# correctly predicted choices	% correctly choices
	probability of choosing A	Choice	Choice A	Choice B	Probability of A		
C	51%	A	7	39	15%	7/46	15%
G	18%	B	14	31	31%	31/45	69%
K	62%	A	27	18	60%	27/45	60%
O	48%	B	11	34	24%	34/45	76%
					Total		55%

The choice sets show that the marginal utilities of the alternatives were very close together for choice C, and only correctly predicted 15% of the actual choices. If we consider all the responses, the predictive validity is 55%, only slightly better than chance. However, this method of evaluating predictive validity purely looks at correctly predicted choices, regardless of the disparity in the choice probabilities. As pointed out by Train [420], this approach ignores the richness of the discrete choice models that present a far more nuanced picture of choice by estimating probabilities.

11.5. Discussion

This chapter has focussed on identifying how women value different physical product characteristics using a nested logit model. This is a two step approach where the choice to use one of the women's barrier methods (substitution from what they did last time) is modelled separately from the choice among the women's barrier methods.

The results provide several important insights. When choosing among the women's barrier methods, microbicides and the diaphragm were generally preferred to the female condom. HIV prevention effectiveness was the most important characteristic to women and seemed to dominate most choices. Although pregnancy prevention effectiveness. HIV was more than twice as important as pregnancy prevention, and was especially important to women who considered themselves at higher risk of becoming HIV infected. Although secrecy was not found to be a critical factor to uptake, women who had experienced difficulties using condoms found it most important for a product to be usable in secret.

Women who used a condom were less likely to try alternative methods. Women who had ever experienced difficulties getting their partner to use a condom, and were living with their partners were more likely to try the women's methods.

The key policy lesson from the physical attributes analysis is that although all women expressed interest in trying microbicides, those who are in greater 'need' of new methods of protection were more likely to choose the new methods. Given these results, some self selection is expected to occur, with microbicide uptake higher among women who are unable to use male condoms. This should be reassuring for those who have expressed concerns about substitution away from male condoms towards possibly less effective microbicides.

Chapter 12. Analysis of a DCE 2: preferences for distribution and promotion strategies

12.1. Background and aims

Chapter 11 focussed on predicting the impact of physical product attributes on product uptake and how this might differ between different women. This chapter aims to assess how best to promote and distribute new barrier methods to facilitate their access. More specifically it aims to answer the following three questions:

- What are women's relative preferences for distribution strategies?
- Are preferences for distributing new products (microbicide and diaphragm) different from those for distributing existing methods (female condom & male condom)?
- How do preferences vary by women's socio demographic characteristics (cohabiting, household socio-economic status, employment status)?

Section 12.2 describes the methods used in this analysis, Section 12.3 present the results and Section 12.3 Discusses the polic implications of these results.

12.2. Methods: Model specification

The general methods for estimating discrete choice models have been described previously. This section describes the specific models used to answer the three study questions. In the first section we describe the variables included in the three models estimated. In the second section we describe the method for choosing between estimators (multinomial logit (MNL) versus random parameters logit (RPL).

12.2.1. Model specification 1: Variables included

To answer this chapter's study question, it was necessary to estimate three separate models, differing in the interaction terms.

The base model without interactions answers the first question and estimates the probably of choosing a given alternative as a function of the:

- **distribution sources**: clinic (CLIN); pharmacy (PHARM); spaza (SPAZ); supermarket (SPKT);
- **collection methods**: box (BOX); from a person behind the counter (CNTR); from a person in a private room (PVTRM); or off a shelf (SHLF);

- **message used to advertise the product**: for HIV prevention (ADHIV); pregnancy prevention (ADPREG); for enhanced pleasure (ADPLS); women's empowerment (WEP);
- **Price**: Free, 5 Rand, 10 Rand, 20 Rand

Main effects equation:

$$V_{Distrib\_main} = \beta_{clin} * CLIN + \beta_{PHARM} * PHARM + \beta_{SPAZ} * SPAZ + (-1 * (\beta_{clin} + \beta_{PHARM} + \beta_{SPAZ}) * SPKT) + \beta_{BOX} * BOX + \beta_{CNTR} * CNTR + \beta_{PVTRM} * PVTRM + (-1 * (\beta_{BOX} + \beta_{CNTR} + \beta_{PVTRM}) * SHLF) + \beta_{ADHIV} * ADHIV + \beta_{ADPREG} * ADPREG + \beta_{ADPLS} * ADPLS + (-1 * (\beta_{ADHIV} + \beta_{ADPREG} + \beta_{ADPLS}) * WEP) + \beta_{price} * PRICE$$

Interaction terms are used to test if preferences for distribution strategies may vary by some key factors (variables). In contrast to the model presented in chapter 11, there were not clear expectations that the interacted variables needed to answer study questions 2 and 3 would only affect specific attributes. This meant that all interaction terms (preferred products and variables describing women's characteristics) needed to be multiplied with each attribute. This became an unwieldy model. It was therefore chosen to estimate a separate model for each study question.

To explore if the new barrier methods are better distributed using different strategies from the existing barrier methods, interaction . Before starting the distribution strategies section of the DCE, women were asked: of the four barrier methods (including male and female condoms) what you think would suit your needs best? That product was then used in each of the distribution scenarios: where would you prefer to get your ….e.g. "Female condom"? The omitted category was male and female condoms[52].

To see if women's socio demographic characteristics affect their valuations of distribution systems, interaction terms were included for: women's employment status (either part- or full-time versus not employed at all); the socio-economic status of women's households; and whether or not women are cohabiting.

[52] We first estimated the difference of distribution preference relative to preferences for distributing the male condom (e.g. women expressed that male condom was their preferred product and thus the distribution strategies all referred to collection of the male condom). However the regression results were counter-intuitive, with many of the main effects losing significance.

12.2.2. Model specification 2: Test for appropriate estimator

To test for the appropriate model, a number of estimations were needed. First, we estimated the main effects model using MNL and RPL to test for violations of IIA and preference heterogeneity (Appendix Table A13-1). The RPL model estimates distributions around the parameter estimates. All main effects parameters were tested for having a distribution. The shape of the distribution of the categorical variables was set as uniform, while for price a triangular distribution was chosen after exploration of the normal and lognormal distributions (pr esented in Appendix Table A13-2). In an iterative approach, in which parameters with insignificant distributions are subsequently not included in the specified random parameters (i.e. modelled as fixed parameters) in the next iteration, no random parameters were left. This resulted in the model collapsing to a standard MNL model. Therefore only MNL estimates are presented in the main text.

12.3. Estimation results

12.3.1. a. What are women's relative preferences for distribution strategies?

In the MNL model (Table 12-1) box, shelf and advertised for pregnancy prevention do not influence choice probabilities, otherwise all attributes and levels are significant. Strongest preferences were around distribution source (largest relative utility coefficients), though advertising for enhanced pleasure also reveals strong negative preferences. Women had large positive utilities for the clinic and the pharmacy, and relatively disliked the supermarket and the spaza. The private room was the most valued collection method.

Contrary to conventional wisdom, both HIV prevention and women's empowerment had positive associations, while pleasure was quite unattractive to most women in our study. This was supported by the qualitative work, where women said that if it was advertise too sexually "*it would be like bringing home pornography*" (30-45 year olds, attribute identification workshop).

Table 12-1 Estimation of distribution strategy preferences

	MNL	
	Coeff.	p-value
Source		
Clinic	0.29	<0.01
Supermarket	-0.20	<0.01
Pharmacy	0.33	<0.01
Spaza (corner store)	-0.43	<0.01
Collection method		
Box or dispensing machine	0.04	0.38
A shelf	0.02	0.65
A person behind a counter	-0.18	<0.01
In a private room	0.11	0.01
Advertising message		
HIV prevention	0.10	0.02
Women's empowerment	0.13	<0.01
Enhanced pleasure	-0.30	<0.01
Pregnancy prevention	0.06	0.15
Price	-0.04	<0.01
llr	-1951.17	

12.3.2. b. Are preferences for distributing new products (microbicide and diaphragm) different from those for distributing existing methods (female condom & male condom)?

Table 12-2 shows MNL results testing for differences in preferences by their preferred new barrier method.

Table 12-2 Utilities for distribution strategies for new and existing products -MNL estimates

	Main effect		Interactions Diaphragm		Microbicides	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Source						
Clinic	0.31	<0.01	-0.04	0.60	-0.08	0.25
Supermarket	-0.22	<0.01	0.00	0.99	0.07	0.27
Pharmacy	0.33	<0.01	0.07	0.37	0.03	0.70
Spaza (corner store)	-0.42	<0.01	-0.03	0.70	-0.02	0.81
Collection method						
Box or dispensing machine	0.05	0.26	0.12	0.07	-0.08	0.16
A shelf	0.03	0.64	0.01	0.87	0.02	0.83
A person behind a counter	-0.21	<0.01	-0.18	<0.01	0.14	0.02
In a private room	0.13	<0.01	0.04	0.56	-0.08	0.22
Advertising message						
HIV prevention	0.11	0.03	-0.16	0.03	-0.02	0.71
Women's empowerment	0.14	<0.01	0.14	0.03	-0.01	0.71
Enhanced pleasure	-0.29	<0.01	-0.10	0.15	-0.01	0.83
Pregnancy prevention	0.05	0.34	0.12	0.07	0.05	0.42
Price	-0.04	<0.01	0.01	0.21	0.00	0.52
Llr	-1934.94					

Preferences for different distribution strategies were different for those women who chose the diaphragm as their preferred product, with higher preferences for collection from a box and for advertising for women's empowerment and pregnancy, and lower preferences for collection from a person behind a counter and promoting diaphragms for HIV prevention. For microbicides there was a less negative preference for collection from a person behind a counter. More generally, distribution of new methods through a person behind the counter was the least attractive collection method, and with this being especially the case for the diaphragm (relative utility -0.39 (=-0.21-0.18)).

In the next section we explore how women's characteristics affect their preferences for distribution strategies.

12.3.3. c. Do preferences vary by women's socio demographic characteristics?

Table 12-3 shows the results of testing for the impact of women's characteristics on their preferences for distribution strategies. Women who were cohabitating had less negative preferences for promoting microbicides for 'pleasure' (though still negative: -0.312+0.102 = -0.210), and were less positive about women's empowerment (0.04). They also had greater price sensitivities.

Employed women had less negative preferences for the spaza (-0.36) and liked distribution from a box or machine. They also were more enthusiastic about women's empowerment messaging. Household socio-economic status had a significant impact only on preferences for private room collection, with women from higher socio-economic status households finding private room collection less important.

Table 12-3 Estimates of Distribution preferences by socio demographic characteristics

	Main effects		Interactions					
			Cohabit		SES		Employed	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Source								
Clinic	0.295	<0.01	0.049	0.34	-0.061	0.30	0.000	0.99
Supermarket	-0.201	<0.01	0.018	0.69	0.018	0.71	0.004	0.93
Pharmacy	0.363	<0.01	-0.056	0.26	0.043	0.41	0.085	0.12
Spaza (corner store)	-0.457	<0.01	-0.012	0.81	0.043	0.38	-0.089	0.09
Collection method								
Box or dispensing machine	0.007	0.882	-0.013	0.77	0.006	0.89	-0.093	0.05
A shelf	0.009	0.874	-0.037	0.52	0.052	0.38	-0.046	0.44
A person behind a counter	-0.158	<0.01	0.041	0.37	0.028	0.55	0.060	0.23
In a private room	0.142	<0.01	0.008	0.86	-0.086	0.08	0.079	0.12
Advertising message								
HIV prevention	0.116	0.017	-0.024	0.60	-0.025	0.60	0.019	0.71
Women's empowerment	0.161	<0.01	-0.118	0.01	0.070	0.16	0.102	0.05
Enhanced pleasure	-0.312	<0.01	0.102	0.03	-0.034	0.50	0.019	0.72
Pregnancy prevention	0.034	0.475	0.024	0.39	0.025	0.82	-0.139	<0.01
Price	-0.034	<0.01	-0.011	<0.01	0.003	0.41	0.006	0.17
llr	-1916.94							

The relative impact of significant women's characteristics on preferences was greatest for box collection by employed women (8 times greater than average: 0.06 versus 0.007) followed by the preferences for advertising for women's empowerment, where a non-cohabiting employed woman's preferences were twice the average preferences for women's empowerment (0.33 versus 0.16).

Model summary

To summarise the impact of products and women's characteristics on distribution strategy preferences, their significant interactions are presented in Table 12-4. Household socio-economic status and microbicide as preferred product appear to have little impact on preferences.

Table 12-4 Impact of preferred product and women's characteristics on distribution strategy preferences

Interactions	None		Products		Women's characteristics		
			Diaphragm	Microbicide	Cohabiting	SES	Employed
	Coeff.	p-value	Sign.	Sign.	Sign.	Sign.	Sign.
Source							
Clinic	0.29	<0.01					
Supermarket	-0.2	<0.01					
Pharmacy	0.33	<0.01					
Spaza (corner store)	-0.43	<0.01					+
Collection method							
Box or dispensing machine	0.04	0.38	+				+
A shelf	0.02	0.65					
A person behind a counter	-0.18	<0.01	---	++			
In a private room	0.11	0.01				-	
Advertising message							
HIV prevention	0.10	0.02	--				
Women's empowerment	0.13	<0.01	+		--		++
Enhanced pleasure	-0.3	<0.01			++		
Pregnancy prevention	0.06	0.15	+				+++
Price	-0.04	<0.01			---		

-/+ is significant at p≤0.1, --/++ at p≤0.05, ---/+++ at p≤0.01

Note: From 3 separate regressions

Though distribution source remains the attribute with the strongest influence on women's choices, it is preferences for advertising messages that have the greatest variation, shown by the number of significant interactions. In fact, despite the significant interactions with other attributes it is only advertising where their relative ordering changes by product or women's characteristics (Figure 12-1). Advertising for women's empowerment is most frequently the most desirable advertising message followed by HIV prevention. In most cases enhanced pleasure was not considered desirable. However, there were a number of exceptions to this. Pregnancy prevention was the second most attractive message for the diaphragm. Cohabiting women's choices were least influenced by advertising strategy, but preferred HIV prevention and pregnancy prevention to women's empowerment. The greatest difference in preferences for advertising messages can be identified among employed women. They had far greater preferences for HIV prevention and most interestingly had positive preferences for enhanced pleasure.

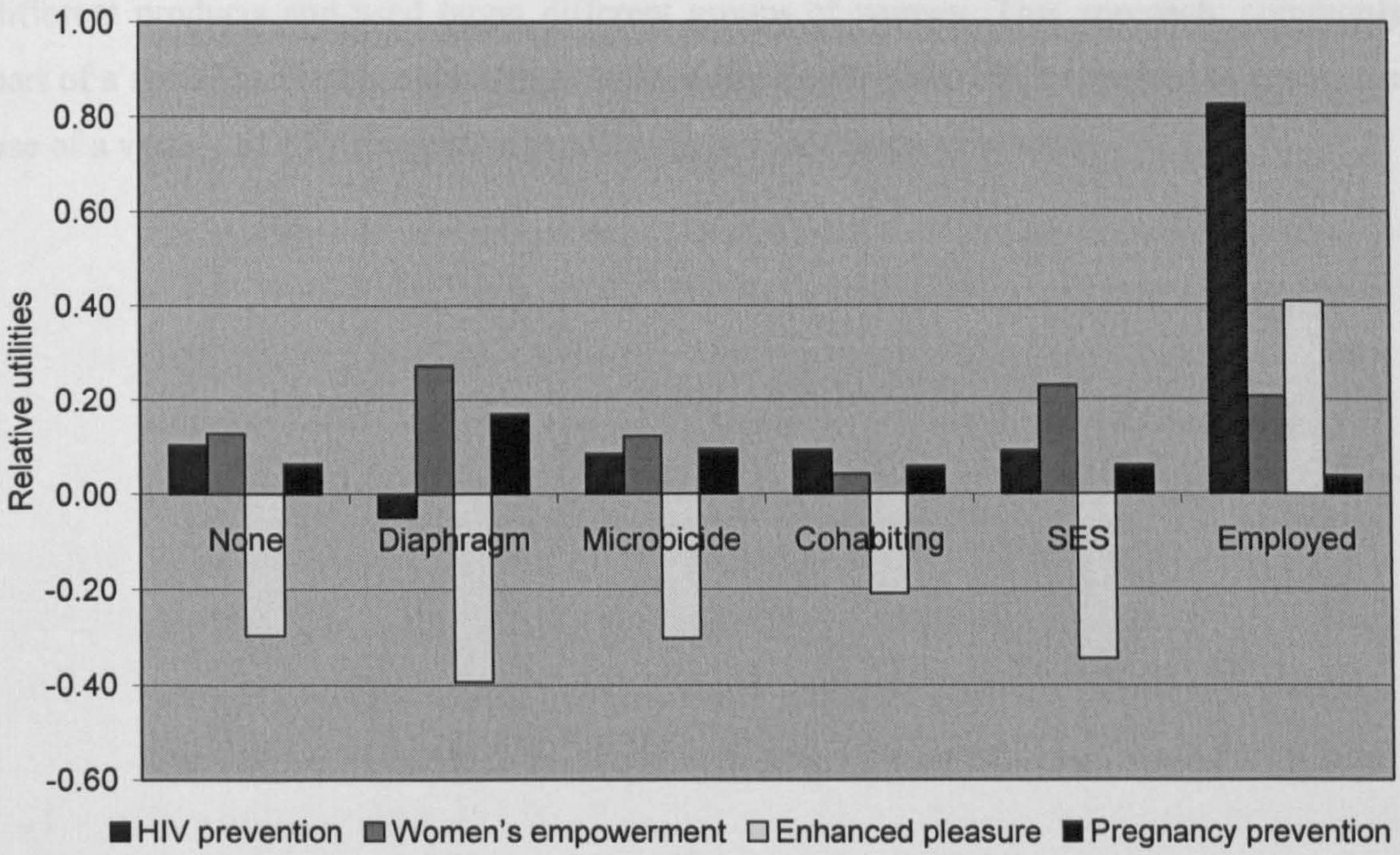


Figure 12-1 Relative advertising preferences by product and women's characteristics

12.4. Summary of results and key policy lessons

This chapter has explored women's preferences for different distribution and promotion strategies. A random parameters logit model was initially estimated to test for violation of IIA and allow for preference heterogeneity (i.e. different people having different preferences). However, this was found to be unwarranted and the MNL model was

subsequently used to answer the study questions. The most popular distribution outlets were clinic and pharmacy, with spaza and supermarket less so. In line with expectations the more discreet collection methods were preferred, in particular from a private room, with from a person behind a counter being least discreet and least preferred, particularly so for the diaphragm. Preferences for advertising products for women's empowerment showed the greatest variation by women's characteristics.

These findings have very interesting policy implications. Firstly to facilitate women's access to products, distribution through pharmacies should complement health clinic distribution. The study also showed that different products do not need to be distributed through different distribution sources or adopt varying collection methods to reach different groups of women. Additionally, it showed that advertising strategies can be used to stimulate demand for different products or differentiated products by different women. This is a very convenient finding because advertising messages are the easiest to adapt to the different products and used target different groups of women. This approach, commonly part of a social marketing approach to commodity distribution, can be applied to encourage use of a variety of HIV prevention products by a wider range of women.

SECTION IV: CONCLUSIONS

Chapter 13. Determinants of women's uptake of new barrier methods for HIV prevention in urban South Africa

13.1. Overview

The fight against the HIV epidemic has taken some very positive turns in recent years, with great increases in funding for and access to HIV treatment [2]. However, for the long term sustainability of such efforts, prevention cannot be over-emphasised. In particular, women still lack HIV prevention strategies they can initiate discreetly [5]. Although female condoms are an important addition to prevention options for women, they do not seem to address all women's needs, and are still not widely available. At the onset of this PhD research both microbicides and diaphragms were potentially important prevention options whose effectiveness was being explored. Although diaphragms have not been shown to be effective, there is ongoing analysis of trial data to explore whether some protection may have been obtained among consistent diaphragm users. And though the recent microbicide trial of Pro2000 has shown this product not to be effective, further trials of other compounds are underway.

This thesis set out to explore what factors may influence the uptake of future female initiated methods for HIV prevention, with the aim of learning lessons that can be used to inform future introduction and distribution strategies. Multiple complementary research methods have been used. Primary data collection has used focus group discussions, individual interviews, attribute identification workshops, and a community survey applying a discrete choice experiment (DCE) among a representative sample of urban South African women. This data was then analysed for women's preferences for barrier methods and their distribution and promotion.

This chapter reviews the extent to which the thesis has addressed the key empirical and methodological questions it set out to answer, and discusses the caveats and limitations of these findings. This chapter further reflects on the general approach to the questions and identifies some priorities for future research.

13.2. Key empirical findings and lessons for new product introduction

13.2.1. Market segmentation

The analysis of potential market segments that allow for identification of some key differences in socio-demographic and 'behavioural' characteristics identified three groups of women with different product and distribution preference. When examining their characteristics, there appears to be a central large group of 'average' women. The two smaller clusters represent a less empowered poorer group of women and more empowered better off group of women.

Analyses using the contingent valuation data showed that the key determinants in women's preferences for the different products were household socio-economic status, age, employment status, cohabitation status and their self-assessed HIV risk status. As expected, socio-economic status was consistently shown to influence the monetary values given, reflecting higher willingness to pay values by women with higher abilities to pay. Younger women were willing to pay more than older women for all products. The key differences in women's valuations *between* the products were between cohabitating and non-cohabitating women: cohabitating women had higher values for the discreet products (microbicides and diaphragm) but not for the female condom, which cannot be used without a partner's participation.

13.2.2. Determinants of women's demand for barrier methods and their attributes

Analysis of the DCE showed that, *ceteris paribus*, microbicides were generally the most attractive among the barrier methods presented, followed by the diaphragm. Female condoms were considered less preferred by most women. Despite much qualitative research focussing on the importance of secrecy of use, this was considered far less important than product effectiveness in preventing HIV and pregnancy. However, this masks the underlying heterogeneity in preferences.

HIV effectiveness came out as being very important to women. A highly HIV effective (95%) microbicide is predicted to be chosen by 56% of women (who had not used a condom) over the female condom or use nothing, while if it was only 35% effective, only 13% of these women are predicted to choose it. Women who had used a condom were far less likely to switch, 32% would switch if the product was highly effective (95%) and 6% would switch to a product moderate effectiveness (35%). This suggests that a microbicide

with moderate effectiveness is unlikely to have widespread appeal, but may nevertheless address an important prevention gap, being twice as likely to be used by women who were unable to protect themselves with existing methods, than women who could use condoms.

Women who had ever experienced difficulties getting their partner to use a condom, and were living with their partners were more likely to try the new methods. Cohabiting women also had higher WTP values for the diaphragm and microbicides in the CV study. Women who had experienced difficulties using condoms found it most important for a product to be usable in secret.

13.2.3. Determinants for women's demand for distribution strategies

The analysis of distribution strategies to facilitate women introducing barrier methods into their relationships and to support continued use showed greatest preferences for the clinic and pharmacy. It is reassuring to know that even if products are restricted to prescription only distribution, these distribution channels would satisfy the largest segment of women. Conveniently these could provide an distribution for both free and priced products. Women had preferences for the more discreet collection methods over those less private, i.e. the private room was generally preferred and collection from a person behind the counter was disliked, in particular for collection of the diaphragm. These preferences were relatively stable across women. However, there was more variation between women in their preferences for the advertising messages, in particular for enhanced pleasure, which was generally disliked except among employed women. HIV prevention was the most widely accepted message.

13.2.4. Lessons for new product introduction

There are a few important policy lessons that can be learned from this study. Firstly, there do appear to be some identifiable market segments, with women who were cohabiting expressing higher preferences for the more discrete products (microbicides and the diaphragm).

Secondly, from the analysis of women's preferences for products and their attributes, we learned that although all women expressed interest in trying microbicides, those who are in greater 'need' of new methods of protection were more likely to choose the new methods. Given these results, some self selection is expected to occur, with microbicide uptake higher among women who are unable to use male condoms. This should be reassuring for those

who have expressed concerns about substitution away from male condoms towards possibly less effective microbicides.

Thirdly, to facilitate women's access to products, distribution through pharmacies should complement health clinic distribution. The analysis also showed that different products do not need to be distributed through different distribution sources or adopt varying collection methods to reach different groups of women. Additionally, it shows that advertising strategies can be used to stimulate demand for different products or differentiated products by different women. This is a very convenient finding as advertising messages will be the easiest to adapt to the different products and can be used to target different groups of women. This approach, commonly part of a social marketing approach to commodity distribution, can be applied to encourage use of a variety of HIV prevention products by a wider range of women.

13.3. Key methodological findings

The study used a discrete choice experiment to investigate women's preferences for physical attributes of products and their distribution strategies. This methodology has rarely been applied in health economics studies to study uptake of new products/services in sub-Saharan Africa. Methodologically there are a number of important findings.

13.3.1. The attribute identification workshops

To date the most commonly recommended and applied method for identifying attributes to be used in DCEs are focus group discussions (FGDs) and in-depth interviews (IDIs) [292, 273, 257]. Because a very large number of attributes and levels were suggested in the qualitative interviews, a further step was necessary to obtain a concrete prioritisation of the importance of the attributes and levels in women's decision making. Twenty-two women participated in the attribute identification workshops to rank the vast range of product and distribution attributes suggested during the qualitative research. This collected all the suggested attributes and levels and allowed women to consider them together and express what was most important to them. While the questions were presented to the group and could be discussed, each woman completed their own questionnaire, generating rankings that could be analysed quantitatively. This was very helpful for rationalising the choice of attributes and levels for inclusion in the DCE tool.

Though this method is recommended for future studies using FGDs and IDIs to identify DCE attributes, if I was to repeat this study I would have configured the fieldwork differently, by seating women at individual desks in a circle rather than around a big table. This would have still encouraged discussion among women while providing them with more privacy in noting down their responses.

13.3.2. The interpretation of product effectiveness

This study also explored women's capacity to evaluate risk in the context of DCEs. A question received repeatedly while presenting this research in various meetings is whether women were able to interpret the level of protection provided by the different products. In general, these findings suggest that women were able to interpret what was being presented. Women's interpretation of the potential level of risk reduction presented was explored using a range of methods. In the evaluation interviews and in the community survey, women were asked to identify the product that would provide the most protection against HIV. In both, this was almost universally answered correctly (>95% in both). The analysis of the DCE showed that improvements in the effectiveness of products preventing HIV had the greatest impact on switching choices, followed by improvements in pregnancy prevention. Although none of these approaches can be used to conclusively establish women's precise interpretation of the absolute effectiveness numbers, this does suggest a good understanding of relative effectiveness. Indeed, this study suggests that women, even of little education, can evaluate the relative risks and benefits of different choices, and factor this into their decision making. Indeed, the challenge may be more that, even with such knowledge and understanding, they may not always be able to enforce their preferences for protecting themselves.

13.3.3. 'Evaluation' interviews

The evaluation interviews identified that the DCE segment of the survey was challenging, not only to participants, but also to the fieldworkers. By including a post survey interview it was possible to identify areas of misinterpretation of the scenarios and allowed for their immediate correction. It also showed how well women did understand the characteristics of the products. This was likely increased by allowing women to view and handle the different products under consideration during their interview.

13.3.4. Validity of using DCE in low and middle income countries

Although well established in health economics in industrialised countries, there are few (though growing numbers of) studies that have undertaken DCEs in low and middle income countries and their remains ongoing question about its applicability in different settings.

The findings from this research suggest that, in this urban South African context particular, DCE methods can provide valid and meaningful findings, athough there were also some emerging issues.

Women's strong preferences for high HIV effectiveness may have caused bias in the results. Thirty-five percent of women always chose the DCE alternative with the highest HIV effectiveness. This may indicate a violation of the axiom of monotonicity (more is better). Possible explanations for this are: that it truly is the only attribute women found important; that the ranges of the other attributes were not wide enough to compensate for the reduction in HIV effectiveness [402]; or that women were applying simplifying heuristics, where they use the most important attribute to simplify the difficult choices with which they are being presented [405, 406]. Although it is not possible to uncover the true explanation for these women's choice behaviour, we found that the estimates largely held when estimated excluding the respondents who displayed non-trading behaviour. The main difference, as would be expected, was in the magnitude of the coefficient for HIV effectiveness. It is possible that this is biased upward.

The DCE generated results that are consistent with the relative rankings from the priority setting workshop and the directly elicited preferences. However, there is some question about the complexity of the scenarios and if women had applied simplifying heuristics. If so this may have led to upwardly biased coefficients for the HIV effectiveness attribute.

Further comparison with the literature shows the results to generally be externally consistent. Kleinschmidt et al (2003) shows the importance of personal and partner characteristics in male condom use in South Africa [9 9]. From our analysis, important motivations for trying new products are: cohabiting, having had difficulties negotiating condom use, and women's own risk perceptions. Similarly, focus groups from Mexico [11] showed secret use of the female condom was not essential but probably useful to some women. Women in ongoing microbicide trials are also reporting that products need to be discreet rather than secret per se [155]. This study shows that secrecy is generally the least essential of the attributes included, but is important to women who have experienced

difficulties negotiating male condom use. The Mexico study also suggested that the female condom would be as unacceptable as the male condom to many women [12]; in this study the female condom was rated more negatively than the microbicide was rated positively.

13.4. Reflections on the approach

13.4.1. The theoretical framework

Chapter 1 identified a number of critical steps between producing new barrier methods and having a successful product that women can use consistently when they need them. The demand by the end user is only one of the key bottlenecks to achieving this.

WHO's Strategic Approach to Contraceptive Introduction was used to conceptualise important dimensions affecting successful product introduction [68]. This aims to move beyond the product characteristics to understand broader constraints to uptake such as attributes of the service and women's characteristics. This framework appeared to identify key dimensions to include in the DCE. It also directs attention to broader societal, political and economic factors, which were outside the scope of this analysis.

13.4.2. Applicability of diffusion theory to barrier method preferences

Diffusion theory (reviewed in Chapter 2) suggests five broad attributes that account for the adoption of innovations [27]: relative advantage, compatibility, complexity, trialability, observability. This research highlights the difference in preferences for new barrier methods between women who had and had not used a condom in their last sex act and the significance of the 'self-perceived risk of HIV variable' which suggests that relative advantage is likely to play an important role in uptake. Compatibility appears only to be important to preferences for the diaphragm. The positive interaction term between having used a male condom in the last sex act and preferences for the diaphragm[53] suggests that the diaphragm is perceived as more compatible among condoms users. Perceptions of complexity of product use are likely both reflected in the preferences for the products and their ability to be used in secret. These variables have very different magnitudes of importance which make commenting on the relevance of complexity difficult. All of the products have high triability at the technical level.

[53] Those who had used a condom in their last sex act had higher preferences for the diaphragm than those who had not used a condom

However, my research also highlights that a number of other dimensions will affect women's actual ability to try the product, such as how accessible the distribution system makes the products. Additionally, partners' attitudes are likely to constrain a products' triability; triability of microbicides is likely to be higher than that of the other new products if they can be used without the partners' active consent. Observability of benefits was very important, reflected by the importance of the HIV and pregnancy effectiveness coefficients. When the effectiveness is lower, the observability of benefits is reduced: prevention of pregnancy or HIV infection becomes less likely. These dimensions can also be considered at a broader level in terms of accessibility of products.

13.4.3. Generalisability of results

The comparison of the survey with comparable surveys of South African women shows high generalisability in the urban South African context.

This is an important country for new product introduction; it has hosted numerous HIV prevention trials (trial communities are the first to receive products if found effective) and has very high HIV prevalences. However, it must be acknowledged that urban South Africa is different from rural South African from many other African country contexts. Firstly, the structure of South Africa's economy is different. Though it is a middle income country, it is better characterised by high income and a low income economies existing in parallel. Being urban, communication networks are good and diffusion of innovations is quick. The speed of uptake of new products may be slower in other countries, where mass media is not as accessible or widespread.

Exposure and uptake of contraceptives has been very high in South Africa and reported condom use is also high, leading to the expectation of more rapid uptake of new prevention methods than in places where contraceptives are not as widespread and condom use is still low or where the public sector is week.

Comparing women's preferences for distribution outlet types with those presented in DHS analysis on where women collected their contraceptives presented (Chapter 9), we found, holding all else constant, that women had very positive and close preference for the clinic and pharmacy, were not in favour of the supermarket and strongly dislike the spaza shop. However, in reality, a critical difference between the clinic and the pharmacy is in the prices of their services and drugs, which makes it impossible to disentangle women's revealed

preferences for price and source. In the 2003 DHS the majority (73%) of urban women obtained their condoms from the clinic or other public sources [30]. If we look at condoms, which is probably a more fair comparison as condoms allow for non-clinic distribution, 63% of women collected them from the clinic, 16% from a pharmacy and 2% from supermarket and spaza each. The rankings are similar, though express a larger difference between clinic and pharmacy and less difference between supermarket and spaza than we found. We do not have comparators from the literature for collection method or advertising strategy.

Although the messages of the importance of the different attributes are likely generalisable, the specific preferences for the attribute levels, in particular relating to distribution strategies, are likely to be specific to the urban South African context.

It is also worth considering the lessons from this study for other new HIV prevention products such as ARV based microbicides, HIV vaccines and pre-exposure prophylaxis (PREP). Some of the key differences to consider are the need for continual supplies in the case of microbicides and PREP, relative to a one off intervention (could be with a sequence of boosters, but a relatively discrete intervention). In such we would expect there to be more in common between vaccines and male circumcision. Both (would) require a series of contacts with a service provider; once completed, the effectiveness of the intervention does not require continued behaviour change / product use.

An important lesson for all HIV prevention products is the large synergistic impact of intervention/product effectiveness and uptake will likely contributing to an even larger impact on the epidemic, if highly effective products are found. On the other hand, projections of impact need to take into account the dynamic effects of a modestly effective product likely resulting modest uptake and thus modest epidemiological impact.

13.4.4. Caveats and areas for improvement for future research

Reflecting back on this research, there are a number of limitations that need to be recognised.

In practice, not all concepts are very easily captured in words or pictures. The concept of "secrecy" was not always clear in people's minds, and the picture of secrecy did not speak to the imagination of respondents. We were also not satisfied with our picture representing advertising for pregnancy prevention. The result of unclear presentation of attribute levels is

likely to underestimate the true value of such an attribute. Women also found it difficult to incorporate into their choices the concept of "in the last sex act". Many women responded based on best intentions in the possible future, rather than realistic and feasible option in their last sex act. The result of this is potentially an overestimate of new product uptake, in particular by women who did not use a condom in their last sex act. In future research, it would be very helpful to have better representations of these concepts, possibly through collaboration with anthropologists or sociologists. In replicating this study, these would need refining.

Secondly, in experimental design there is a trade off between a strictly orthogonal experimental design and not presenting unrealistic scenarios. In this study, it led to the loss of orthogonality. In estimation this led to non convergence of more sophisticated models. This was especially disappointing when it came to estimating the RPL model with correlations, which wou ld have allowed for identification of a package of distribution strategy attributes that were correlated and would have guided the composition of distribution strategy packages. If repeating such an exercise, I would consider it important to consult with DCE design experts and test the design prior to the survey. However, the thanks to a large sample size, it was possible to estimate the appropriate models to answer our study questions.

We developed the scenarios as a generic experiment because we thought that would facilitate valuation of products and distribution sources independent of their attributes. In practice, it appeared that many of the women did have fuller associations related to both the product and distribution source beyond the attributes included in the experiment. Although the results do appear plausible, future DCEs of barrier methods would be more suitable to a labelled experiment. This would also this save on degrees of freedom in estimation as the socio demographic characteristics can be included directly into the model rather than as interaction terms as we had to do here.

However, despite these caveats, the models appear to generate intuitive results and the policy recommendations.

13.5. Areas for future research

This analysis aims to contribute to facilitating women's access to HIV prevention products, but clearly could not identify all critical bottlenecks to ensuring access in all countries. This study has raised a number of further questions:

Four other key players are likely to play an important role in the "success" of new barrier methods. First, once an effective product is identified, the international funding bodies will need to put their full weight (both support for product and financing to back this up) behind the product without hesitation. Second, country regulatory authority support is necessary to approve products. The International Partnership for Microbicides is very active in identifying and working on facilitating the regulatory processes in countries that are likely to be frontrunners in introducing new barrier methods due to their willingness to host existing trials on the products. Many of these countries also have advocacy groups that are working on mobilising political support for these products. Third, the female condom experience showed that providers' preferences against the female condom caused stigmatisation. Lastly, men's preferences are likely to have a strong impact on the consistency of women's use.

Other studies of uptake, using DCE, are warranted in those countries where early introduction is expected, such as India, and other African countries which have hosted microbicide trials, such as Tanzania, Uganda and Zambia.

Modelling studies are looking at the optimal strategies for microbicide introduction could use the information on preferences to model the speed of uptake under various scenarios and understand how the product characteristics and distribution and promotion strategies adopted will impact on the HIV epidemic.

There is also the need to refine the research methods to reflect the characteristics of products in the microbicide/ HIV prevention technology pipeline. First generation microbicides are all coitally dependent gel based products. The future generations of microbicides are likely to be antiretroviral drug based. This would change the scenarios considerably. Such products may not be coitally dependant, with products being inserted daily or even monthly (in a vaginal ring); and they are unlikely to have any pregnancy prevention effectiveness. With active antiretroviral ingredients, provision will need to be linked to routine HIV testing to ensure that use is only among HIV negative women, and it is highly unlikely that they will be provided over the counter in the foreseeable future. This implies there will be limited scope for non-medical distribution or mass product promotion with product differentiation in the short term.

However, this study has shown that this may not be as detrimental to access as initially thought because the clinic and pharmacy were by far the most preferred access points for

women anyway. Critical attributes of new products are likely to be more around the physical attributes and frequency of insertion (or consumption in the case of pre-exposure profylaxis products in the pipeline (see Box 1-1). These factors which would need to be reflected in future demand studies for new HIV prevention products.

This study can also contribute to the consideration of uptake of HIV vaccines. A recent large scale phase 3 vaccine trial in Thailand showed it significantly decrease the risk of HIV infection by 31.5% [476]. However, such a low effectiveness provides policymakers with a great dilemma due to concerns about disinhibition and recipients understanding of the level of protection the vaccine would provide to the individual. This study suggest that South African women are able to make appropriate choices for themselves based on represenatations of relative risk. Such representations may be helpful in project uptake of partially effective vaccines, once discovered.

13.6. Final conclusion

In this thesis I have developed, implemented and analysed a DCE study on the uptake of new HIV prevention technologies for women. From this study we learned that hierarchical messages including information on HIV effectiveness can be part of an effective HIV prevention intervention. Women can use this information to make choices about the best and most feasible way to protect themselves in their situations. In general, women valued the choice of outlets, in particular being able to collect products from both health clinics as well as pharmacies. Importantly, this study showed that distribution systems do not per se need to be different for new products or to reach different groups of women. This study shows that product positioning and advertising is likely to be quite effective in differentiating the market, and may contribute toward making the product appeal to a wider range of women than would be achieved from a single marketing strategy.

These broad lessons are likely to hold-outside of the context of urban Johannesburg. However the precise manner in which hierarchical messaging and the precise type of product promotion is likely to vary by location, as is commonly acknowledged in the marketing world.

Methodologically also, we show that DCE studies can be a useful approach to better understanding women's preferences. In depth qualitative research and a focussed workshop can help focus the DCE research to key issues.

To date there has been substantial investment in finding methods that can help women protect themselves from HIV. There has been far less research to inform future product introduction and distribution. This is an important omission.

A good understanding of the determinants of women's preferences and the demand for barrier methods will play an important role in facilitating women's access to new methods when they become available. This work showed that a combination of appropriate personal information, appealing promotion, and free or very low priced products distributed through clinics or pharmacies is likely to encourage substantial new product uptake by women who need it.

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APPENDICES

Table of Contents

Appendix 1. FGD tools

Appendix 1.1 Topic guides FGDs

Hi my name is .....
Thank you for agreeing to have this group discussion with us. There are studies testing the effectiveness of new products in preventing HIV and sexually transmitted diseases. These products that are being tested will be inserted vaginally. Today we are gathered to understand your opinions of these products. These focus group discussions are asking women to help us describe:

- these different products to different people,
- where women would like to get them and why,
- how they should be advertised and why, and
- the types of partners they might use them with.

We will not cover all of these questions today though. Today we are going to discuss why women use or do not use male and female condoms, and discuss the different ways we can describe our male partners.

Your comments are confidential and will be analysed together with the contributions from other groups. Please do not discuss other people's comments out of this group. Remember there are no right or wrong answers. We are not here to judge you. All the deliberations of this discussion will be treated with our utmost confidence.

FGD Topic A (2): Determinants of condom use and partner types

Lets first talk about using male and female condoms:

1. Condom use:
   Male
   a. To someone who has never heard of male condoms how would you describe them and the experienced using them?
   b. Why do women use male condoms with their partners?
   c. Why do they not use male condoms?
   d. What kind of problems might be encountered to use male condoms?

   Female condoms:
   e. To someone who has never heard of female condoms how would you describe them and the experienced using them?
   f. Why do women use female condoms?
   g. Why do they not use female condoms?
   h. What kind of problems might be encountered to use female condoms?

Now let's talk about partner's

2. What kind of partners can you have throughout your life?
   a. How do these types of partners differ?
   b. How are these types of partners the same?
   c. How do these different types of partners affect women's willingness and ability to use condoms to protect themselves from HIV?

FGD Topic B (2): Determinants of distribution channel use, Promotional messages

3. Where do you get male condoms (make list)
   a. Are there other places women can get male condoms from?
   b. What makes you prefer one place over another?

   PROMPT if not raised spontaneously

c. How are these places different?
d. How are they the same?
e. What kind of problems might women encounter to access male condoms?

Here we are looking for the main characteristics of the different distribution channels that effect women's choices of where they go. We want a description of the different distribution channels focussing on what are the most important reasons for going to a specific provider/distribution source. This can include things like, price, transport access, opening time access, attitudes of staff etc etc

4. For Female condoms, do women prefer to get them in different places than male condoms?
   a. Where? (list)
   b. Why?
   c. Now if female condoms could be obtained from anywhere, where would you like to get them and why? (*for example hair salon and other non conventional placess?)*

Here we interested to see if different characteristics of distribution channels are important for female condoms relative to male condoms, and to generate distribution channel ideas outside of the standard health system distribution.

Promotional messages

5. If you were a nurse or shop keeper and your task was to sell **male** condoms, what message would you use to advertise them so that people like yourself would buy them?

6. If you were a nurse or shop keeper and your task was to sell **female** condoms, what message would you use to advertise them so that people like yourself would buy them?

This question aims to generate different advertising messages that people might find attractive to themselves and their partners and might make the products easier to use. This may include messages about HIV/STI/pregnancy prevention, female control, specific physical attributes of the product, image (pleasure, being cool, etc etc

FGD Topic C (2): New Methods- microbicides

Now lets discuss these new products that are being tested.

The microbicides that we are going to test will be a gel that women insert into their vaginas before having sex. We are trying to understand which things women find important in wanting to use them and being able to use them.

1. From looking at these this **microbicide**, how would you describe it?
   a. What would you want to know about them to decide to try them?

Now try to answer these questions -> Fern to answer groups questions

   b. Now we have given you some more information, how would you feel about trying it?
   c. What about using them in the longer term, every time you have sex?
   d. What do you think your partners would think about them?
   e. Could they be used without your partners knowledge?
   f. Where would you like them to be available to you?

2. If **microbicides** were available, do you think you would use some kind of HIV protection more often?

3. If these were available, do you think you would use condoms less?
   a. What if they only provide ½ the protection that condoms provide?

4. How much do you think you would be willing to pay for a single use applicator of microbicides?

5. What is the highest amount you can imagine anyone being willing to pay for such a microbicide for a single use dose of a microbicides?

6. If you were a nurse or shop keeper and your task was to sell **Microbicides**, what message would you use to advertise them so that people like yourself would buy them?
    a. How about messages to make them easier to introduce to your partners?

7. Now that you have described these new methods, what would be the four most important things for you to try a **microbicide**?

Write them on a blackboard or paper, then give people a pen and a response card to hand in to the moderator. Then hold a show of hands vote.

FGD Topic C (2) : New Methods-diaphragm

Now lets discuss these new products that are being tested.

The diaphragm is a physical barrier method that covers the cervix (show prototypes). There are many ways of describing them. We are trying to understand which things women find important in wanting to use them and being able to use them.

1. From looking at these this **diaphragm**, how would you describe it?
    a. What would you want to know about them to decide to try them?

Now try to answer these questions -> Fern ???

    b. How would you feel about trying it?
    c. What about using it in the longer term, every time you have sex?
    d. What do you think your partners would think about them?
    e. Could they be used without your partners knowledge?
    f. Where would you like them to be available to you?

2. If **the diaphragm** was available, do you think you would use some kind of HIV protection more often?

3. If these were available, do you think you would use condoms less?
    a. What if they only provide ½ the protection that condoms provide?

4. How much would you be willing to pay for a diaphragm that you could use for up to 2 years?

5. What is the highest amount you can imagine anyone being willing to pay for a reusable diaphragm used with spermicide?

6. If you were a nurse or shop keeper and your task was to sell **Diaphragms**, what message would you use to advertise them so that people like yourself would buy them?
    a. How about messages to make them easier to introduce to your partners?

7. Now that you have described these new methods, what would be the four most important things for you to try a **diaphragm**?

Write them on a blackboard or paper, then give people a pen and a response card to hand in to the moderator. Then hold a show of hands vote.

Appendix 1.2 Information sheet FGDs

Hello, my name is ..... I am working on a project for the Reproductive Health and HIV Research Unit and the London School of Hygiene and Tropical Medicine. I would like to invite you to participate in a research study on women from Ekurhuleni .

Why are we conducting this study?
Many women in South Africa are infected with HIV every day. In many cases it is because women find it difficult to persuade their partners to use condoms during sex. At the moment, the condom is the only reliable method of preventing HIV. Researchers are now trying to develop new methods of preventing HIV, called microbicides and the diaphragm, which can be used and controlled by women.

What is this study about?
This study aims to understand the reason that women use or do not use male or female condoms and the reasons they may decide to the use these newer methods, if they are found to be effective. We are interested in what women think about these new methods, where women would be interested in obtaining them, and how women think they should be advertised. This study will provide us with important information necessary to facilitate access to barrier methods which women can use to protect themselves from HIV.

REMEMBER: WE ARE NOT PROVIDING ANY PRODUCTS FOR THIS STUDY

Who can take part?
You can take part if you:
- Are willing to participate in a focus group discussion
- Are between the age of 18 and 45
- Have had sexual intercourse at least once in the past 6 months

What do you have to do if you agree to take part?

Attend focus group discussions.
You have been asked to participate in focus group discussions. The focus group discussion will take approximately two hours of your time.

All focus group discussions will be recorded on audio tape. This is to ensure that the information we collect is accurately recorded. Later we will write down the information and store this on a computer. All tapes will be kept in a locked cabinet. No one except program staff will be able to listen to the tapes or view the material. After the research has been completed all audio tape recordings will be destroyed.

This information will be used by us to gain more insights into how to ask women where they get male and female condoms and what women think about microbicides and the diaphragm. By participating you are helping us decide on how to do research on microbicides.

Will the information from these focus group discussions be confidential?
As researchers we guarantee your confidentiality. You will not be identified by name on any documentation. No one will have access to any tape recordings and all tapes will be destroyed at the end of the study. We cannot, however, guarantee that other participants in the focus group discussion maintain your confidentiality but will encourage confidentiality through a discussion of this issue with all participants before the FGD starts. We will attempt to ensure that all participants maintain one another's confidentiality by requesting that you, or any of the participants, do not discuss the content of what any of the participants said during the focus group discussion with any people outside. This is to ensure your opinion and other people's opinions and experiences are kept confidential.

Will the study benefit you?
There is no immediate benefit to you by participating in this part of the study. However, you will be compensated for your transport costs and will be given R50.00 for this.

What are the risks?
The focus group discussions may discuss some personal issues. You will also be asked to discuss your experiences in a group setting but you may chose not to tell what you consider private information in the company of others. Although all participants are requested to not to discuss what has been said during these discussion with anyone else, we cannot guarantee full confidentiality.

What happens if you change your mind about taking part?
You can choose not to answer any of the questions that you do not want to answer. You can withdraw from the focus group discussion at any time without giving a reason. Not answering specific questions or withdrawal from the discussion will not negatively affect you.

What happens if I have any problems during the focus group discussion?
If you have a problem resulting from your participation in this focus group discussion, assistance is available from:

Fern Terris-Prestholt Visiting Research Fellow Reproductive Health and HIV Research Unit 11th Floor Nurses Home C H Baragwanath Hospital Soweto Tel: 011 933 1228 Cell: 072 9350393 (24 hours accessible) Fax: 011 933 1227	Dr Catherine McPhail Director: Adolescent Health Reproductive Health and HIV Research Unit 11th Floor Nurses Home C H Baragwanath Hospital Soweto Tel: 011 933 1228 Cell: 083 441 5415 (24 hours accessible) Fax: 011 933 1227
Prof Helen Rees Principal Investigator Reproductive Health and HIV Research Unit 11th Floor Nurses Home C H Baragwanath Hospital Soweto Tel: 011 933 1228 Cell: 083 572 2057 (24 hours accessible) Fax: 011 933 1227	Dr Lilani Kumaranayake Principal Investigator Health policy unit London School of Hygiene and Tropical Medicine Keppel Street WC1E 7HT Tel: 001-902 431-3686 (24 hours accessible) Fax: 001-902 431-3689
You may also discuss any concerns you might have regarding your participation with any of the nurses, counsellors or community health workers involved in the study. This study is conducted in accordance with the Department of Health Guidelines for the Good Practice in the Conduct of Clinical Trials in Human Participants in South (2000), and has received ethical approval from the University of the Witwatersrand, Human Research Ethics Committee: (Medical). If you have complaints about how you were treated or feel that the study has caused you harm please contact:	
Prof Peter Cleaton-Jones Chairperson for the Committee for Research on Human Subjects University of the Witwatersrand, Human Research Ethics Committee: (Medical) Tel: 011 717 2229	

Appendix 1.3 Informed consent form FGDs

Statement of INFORMED Consent [1]

The participant must complete the following questions herself/with a staff member who did not administer the consent		
Have you had an opportunity to read the consent form/have it read to you?	YES	NO
Have you had an opportunity to ask questions and discuss this study?	YES	NO
Have you received satisfactory answers to all of your questions?	YES	NO
Have you received enough information about the study?	YES	NO
Do you understand the benefits of the study?	YES	NO
Do you understand the risks of the study?	YES	NO
Do you agree to not discuss what other participants have said during the focus group discussion outside of this group?	YES	NO
Which study staff member have you spoken to about the study? PLEASE PRINT HIS/HER NAME:		
Do you understand that you are free to not answer any of the questions at any time without having to give a reason for not wanting to answer the question?	YES	NO
Do you understand that you are free to withdraw from the discussion at any time without having to give a reason for withdrawing?	YES	NO
Do you agree to take part in this study?	YES	NO
If the participant answers NO to any of the above questions then she may not be enrolled in the study.		
Printed name of Investigator		Date
Signature of participant		Time

Do you agree to the focus group being tape recorded?		YES	NO
Printed name of Investigator		Date	
Signature of participant		Time	

Do you agree that some of your responses be quoted in a manner in which you cannot be identified?		YES	NO
Printed name of Investigator		Date	
Signature of participant		Time	

[1] Always given with an information sheet

Appendix 2. FGD participant's background information

	Younger (18-29 years)	Older (30-45 years)	Total
	Col %	Col %	Col %
Location			
Spruitview	25.0	31.0	27.9
Vosloorus	46.9	31.0	39.3
Zonkizizwe	28.1	37.9	32.8
	100.0	100.0	100.0
Partner type			
husband	2.1	48.0	25.8
Regular	53.2	28.0	40.2
casual	42.6	18.0	29.9
one-off	2.1	6.0	4.1
	100.0	100.0	100.0
House type			
RDP	12.8	16.0	14.4
bond house	27.7	24.0	25.8
room outside	4.3	6.0	5.2
shack	25.5	26.0	25.8
municipal	17.0	18.0	17.5
big house	12.8	8.0	10.3
missing		2.0	1.0
	100.0	100.0	100.0
Employment status			
employed full time	4.3	14.0	9.3
emplyed part time	6.4	6.0	6.2
self employed		6.0	3.1
student/scholar	23.4		11.3
unemployed	61.7	54.0	57.7
housewife		18.0	9.3
other	4.3	2.0	3.1
	100.0	100.0	100.0
Educational attainment			
primary incomplete		8.0	4.1
primary complete	2.1		1.0
secondary incomplete	48.9	76.0	62.9
secondary incomplete + vocational	6.4	6.0	6.2
secondary complete	36.2	8.0	21.6
tertiary incomplete	6.4		3.1
tertiary complete		2.0	1.0
	100.0	100.0	100.0

	means	means	means
age	22.8	39.2	30.9
# of children	0.8	2.7	1.8
# of rooms used for sleeping	4.0	3.4	3.7
# of inhabitants	4.9	4.4	4.6
Crowding	1.5	1.7	1.6

Appendix 3. IDI tools

Appendix 3.1 Information sheet and informed consent form IDIs

Hello, my name is ….. I am working on a project for the Reproductive Health and HIV Research Unit and the London School of Hygiene and Tropical Medicine. I would like to invite you to participate in a research study on women from Ekurhuleni .

Why are we conducting this study?
Many women in South Africa are infected with HIV every day. In many cases it is because women find it difficult to persuade their partners to use condoms during sex. At the moment, the condom is the only reliable method of preventing HIV. Researchers are now trying to develop new methods of preventing HIV, called microbicides and the diaphragm, which can be used and controlled by women.

What is this study about?
This study aims to understand the reason that women use or do not use male or female condoms and the reasons they may decide to the use these newer methods, if they are found to be effective. We are interested in what you think about these new methods, where you would be interested in obtaining them, and how you thing they should be advertised. This study will provide us with important information necessary to facilitate access to barrier methods which women can use to protect themselves from HIV.

REMEMBER: WE ARE NOT PROVIDING ANY PRODUCTS FOR THIS STUDY

Who can take part?
You can take part if you:
- Are willing to participate in an in-depth interview
- Are between the age of 18 and 45
- Have had sexual intercourse at least once in the past 6 months

What do you have to do if you agree to take part?

Participate in an in-depth interviews
You have been asked to participate in an in-depth interview. The interview is expected to take between 1 and 2 hours of your time.

All in-depth interviews will be recorded on audio tape. This is to ensure that the information we collect is accurately recorded. Later we will write down the information and store this on a computer. All tapes will be kept in a locked cabinet. No one except program staff will be able to listen to the tapes or view the material. After the research has been completed all audio tape recordings will be destroyed.

This information will be used by us to gain more insights into how to ask women where they get male and female condoms and what women think about microbicides and the diaphragm. By participating you are helping us decide on how to do research on microbicides.

Will the study benefit you?
There is no immediate benefit to you by participating in this part of the study. However, you will be compensated for your transport costs and will be given R50.00 for this.

What are the risks?
The interview may ask some personal questions, but because these interviews are confidential there are no risks to you in giving this information.

Will the information from these in-dept interviews be confidential?
Yes, all results of the in-depth interviews will be confidential. You will not be identified by name on any documentation. No one will have access to any tape recordings and all tapes will be destroyed at the end of the study.

What happens if you change your mind about taking part?
You can withdraw from the in-depth interview at any time without giving a reason. You can also choose not to answer any of the questions that you do not want to answer. Withdrawal from the interview or not answering specific questions will not negatively affect you.

What happens if I have any problems during the in-depth interview?
If you have a problem resulting from your participation in this in-depth interview, assistance is available from:

Fern Terris-Prestholt Visiting Research Fellow Reproductive Health and HIV Research Unit 11th Floor Nurses Home C H Baragwanath Hospital Soweto Tel: 011 933 1228 Cell: 072 9350393 (24 hours accessible) Fax: 011 933 1227	Dr Catherine McPhail Director: Adolescent Health Reproductive Health and HIV Research Unit 11th Floor Nurses Home C H Baragwanath Hospital Soweto Tel: 011 933 1228 Cell: 083 441 5415 (24 hours accessible) Fax: 011 933 1227
Prof Helen Rees Principal Investigator Reproductive Health and HIV Research Unit 11th Floor Nurses Home C H Baragwanath Hospital Soweto Tel: 011 933 1228 Cell: 083 572 2057 (24 hours accessible) Fax: 011 933 1227	Dr Lilani Kumaranayake Principal Investigator Health policy unit London School of Hygiene and Tropical Medicine Keppel Street WC1E 7HT Tel: 001-902 431-3686 (24 hours accessible) Fax: 001-902 431-3689

You may also discuss any concerns you might have regarding your participation with any of the nurses, counsellors or community health workers involved in the study.

This study is conducted in accordance with the Department of Health Guidelines for the Good Practice in the Conduct of Clinical Trials in Human Participants in South (2000), and has received ethical approval from the University of the Witwatersrand, Human Research Ethics Committee: (Medical). If you have complaints about how you were treated or feel that the study has caused you harm please contact:

Prof Peter Cleaton-Jones Chairperson for the Committee for Research on Human Subjects University of the Witwatersrand, Human Research Ethics Committee: (Medical) Tel: 011 717 2229	

STATEMENT OF INFORMED CONSENT

The participant must complete the following questions herself/with a staff member who did not administer the consent		
Have you had an opportunity to read the consent form/have it read to you?	**YES**	**NO**
Have you had an opportunity to ask questions and discuss this study?	**YES**	**NO**
Have you received satisfactory answers to all of your questions?	**YES**	**NO**
Have you received enough information about the study?	**YES**	**NO**
Do you understand the benefits of the study?	**YES**	**NO**
Do you understand the risks of the study?	**YES**	**NO**
Which study staff member have you spoken to about the study? **PLEASE PRINT HIS/HER NAME:**		
Do you understand that you are free to not answer any of the questions at any time without having to give a reason for not wanting to answer the question?	**YES**	**NO**
Do you understand that you are free to withdraw from the interview at any time without having to give a reason for withdrawing?	**YES**	**NO**
Do you agree to take part in this study?	**YES**	**NO**
If the participant answers NO to any of the above questions then she may not be enrolled in the study.		
Printed name of Investigator		**Date**
Signature of participant		**Time**

Do you agree to the interview being tape recorded?		**YES**	**NO**
Printed name of Investigator		**Date**	
Signature of participant		**Time**	

Do you agree that some of your responses be quoted in a manner in which you cannot be identified?		**YES**	**NO**
Printed name of Investigator		**Date**	
Signature of participant		**Time**	

Appendix 3.2 Topic guides IDIs

Hello, my name is ……
Thank you for agreeing to have this interview with us. We have requested this interview to understand how you make your choices about HIV prevention, your use of condoms and contraceptives and where you go to obtain these products. This will help us learn about how best to distribute new methods for HIV prevention specifically made for women's use. There are studies testing the effectiveness of a microbicide and of the diaphragm in preventing HIV and sexually transmitted diseases. These product to be tested will be inserted vaginally, and might not be noticed by your partner.

We would like to let you know that your comments are confidential and will be analysed together with the contributions from other interview. Remember there are no right or wrong answers. We are not here to judge you. All the deliberations of this discussion will be treated with our utmost confidence. You have the right to skip any questions that you do not want to answer and the right to discontinue the interview at any time you wish.

We would like to start off with some background information about you. You are welcome to use another name if that makes you feel more comfortable.

1. Interview date: _____/_____/_____
   Day / Month / Year
2. Interviewer name: _____
3. Interview start time: _____

Section 1: generic background information

Can you tell me a bit about yourself?

Section checklist:
4. ☐Age
5. ☐Language spoken at home
6. ☐Highest level of education gained?

Tell me a bit about where you live:

7. ☐ Years lived in area
8. ☐ Where lived before moving here
9. ☐ Type of house they live in
10. ☐ Number of rooms used for sleeping
11. ☐ Number of people living there?
12. ☐ Relationship to head of household

Tell me a bit about what you do for work?
13. ☐ Employment status?
14. ☐ Type of work
15. ☐ How paid
16. ☐ Where the work took place

Can you tell me a bit about what the head of household does?
17. ☐ Employment status?
18. ☐ Type of work
19. ☐ How paid
20. ☐ Where the work took place

Can you tell me a bit about your last sexual encounter
21. ☐ Partner type
22. ☐ Barrier method used?
23. ☐ Contraception used?

Section 2 In-depth interviews specific questions/ topics
Topic 1 : Contraceptive histories

3 interviews by age group: 23-28 ; 33-38 ; 43-48

Aim: To understand the determinants of contraceptive use and influences of partner, distribution channel and information source, using a contraceptive history timeline, with 2 lines: contraceptive methods and partners. Aim to get stories from beginning of sexual debut on partners, technologies, channels, and information sources and understand choices made.

Now I would like to move on to the main section of this discussion and I would like to hear about your experiences from when you first started using contraception until your current contraceptive method.

1. Can you tell me about the first time you used contraception?
    a. Type of method used first
    b. reason for using specific type of contraceptive/barrier method,
    c. what was already known about the method before trying it,
    d. from where/whom this knowledge was obtained

2. What type of channel was visited to receive the method
    a. why channel was chosen,
    b. experience at that channel

3. Did you know which method you wanted before going to that channel, or did you first choose to go there, then decide which method to use? (Was the choice simultaneous or in 2-steps?)

4. Types of partnerships while using that method

5. Reason for stopping/changing/adding method.
    a. Probe also for dual method use and reasons, Risk of HIV

Can you tell me about your first boyfriend……, did you have sex with him? Had you already had sex before that? Can you tell me about the first time you had sex? Where, when, why, with whom, using any protection for HIV or pregnancy?

Put years on time line, then next to the contraceptive timeline, put the partnership history, probe for one-offs and use of any method. Also probe for duration between switching methods within partnership types (common to 1st use condoms then move to a hormonal contraceptive)

Section 2 In-depth interviews specific questions/ topics
Topic 2a: New Methods and critical attributes (Female Condom, Microbicides and Diaphragm)

Now lets discuss these new methods that are being tested.
You may already be familiar with the female condom. The microbicides that we are going to test, will be a gel that women insert into their vaginas before having sex. The diaphragm and the cervical caps are physical barrier methods that cover the cervix (show prototypes). There are many ways of describing them. We are trying to understand which things women find important when choosing to use barrier methods and how they might choose between the different methods.

1. From looking at these three methods how would you describe them?
2. What would you want to know about them to decide to try them? Why?
3. What about longer term use every time you have sex?
4. What do you think your partners would think about you using each of these methods? Why?
5. Could they be used without your partners knowledge? How important is this?
6. Are they something you would try? Why? Why not?
    a. If yes, Where would you like them to be available to you? And why?
    b. Would where they can be obtained have a strong influence on women's ability to use these methods?
7. If these were available, do you think you would use condoms less? Why, Why not?

a. What if they microbicides and the diaphragm only reduce your risk of HIV infection by 50% while condoms provide 95% protection?

8. If you were a nurse or a shopkeeper selling **Female condoms**, what message would you use to advertise them so that people like yourself would buy them? Why?
    a. What message would you use to make them attractive to your partner?
9. If you were a nurse or a shopkeeper selling **Microbicides**, what message would you use to advertise them so that people like yourself would buy them? Why?
    a. What message would you use to make them attractive to your partner?
10. If you were a nurse or a shopkeeper selling the **Diaphragm**, what message would you use to advertise them so that people like yourself would buy one? Why?
    a. What message would you use to make it attractive to your partner?
11. Do you think advertising messages are important in influencing people to use a method?
12. How much do you think you would be willing to pay for a single use applicator of **microbicides,** in your current situation?
13. What is the highest amount you can imagine anyone being willing to pay for such a single use dose of a **microbicides**?
14. How much do you think you would be willing to pay for a **Diaphragm** that you could use for 2 years with a tube of gel which would last 4 months in your current situation? And a single use disposable diaphragm?

15. What is the highest amount you can imagine anyone being willing to pay for such a **diaphragm** with gel?
16. For **female condoms** what are the most important things that would make you choose them and make it possible for you to use them in your current situation and why?
    a. After that which is most important and why?
    b. And then?
    c. Which of these is least important to you?
17. For **Microbicides** what are the most important things that would make you choose them and make it possible for you to use them in your current situation and why?
    a. After that which is most important and why?
    b. And then?
    c. Which of these is least important to you?
18. For **Diaphragm** which are most the 3 most important attributes?
    a. After that which is most important and why?
    b. And then?
    c. Which of these is least important to you?

Section 3: closing section
Asset index

24. Would you say that the money that you bring into the family/household is more than what your husband / partner contributes, less that what he contributes, or about the same as he contributes.

☐ More ☐ Less ☐ About the same

25. Does your household have:
- ☐ Electricity
- ☐ A radio
- ☐ A television
- ☐ A telephone
- ☐ A refrigerator
- ☐ A personal computer
- ☐ A washing machine

26. Does an y member of your family own:
- ☐ A bicycle
- ☐ A motorcycle or motor scooter
- ☐ A car
- ☐ A donkey or a horse
- ☐ Sheep or cattle

27. In the last 12 months, have you or any members of this household been prescribed medicine that you didn't obtain because you couldn't pay? ☐ Yes ☐ No

28. If a person became ill in your home and R100 was needed for treatment or medicines, would you say it would be very easy, easy, quite difficult or very difficult to find the money?
☐ Very easy ☐ Easy ☐ Quite difficult ☐ Very difficult

We have now come to the end of the interview. Thank you very much for your participation and your openness. Do you have any comments or questions about the interview?

Interview end time:

Appendix 4. Managing men: women's dilemmas about overt and covert use of barrier methods for HIV prevention.

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Managing men: women's dilemmas about overt and covert use of barrier methods for HIV prevention

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Women in sub-Saharan Africa are at high risk of HIV infection and may struggle to negotiate condom use. This has led to a focus on the development of female-controlled barrier methods such as the female condom, microbicides and the diaphragm. One of the advantages of such products is their contribution to female empowerment through attributes that make covert use possible. We used focus groups to discuss covert use of barrier methods with a sample of South African women aged 18–50 years from Eastern Johannesburg. Women's attitudes towards covert use of HIV prevention methods were influenced by the overarching themes of male dislike of HIV and pregnancy prevention methods, the perceived untrustworthiness of men and social interpretations of female faithfulness. Women's discussions ranged widely from overt to covert use of barrier methods for HIV prevention and were influenced by partner characteristics and previous experience with contraception and HIV prevention. The discussions indicate that challenging gender norms for HIV prevention can be achieved in quite subtle ways, in a manner that suits individual women's relationships and previous experiences with negotiation of either HIV or pregnancy prevention.

Keywords: barrier methods; HIV prevention; South Africa; covert use

Introduction

In South Africa, as is the case in most sub-Saharan African countries, HIV prevalence levels are high particularly among women. A nationally representative survey conducted in 2005 indicated a prevalence of 20.2% among women and 11.7% among men aged 15–49 years (Shisana et al. 2005). There is evidence that women's greater susceptibility to HIV is the result of the physiology of the female genital tract (Mayer and Anderson 1995; Morrison et al. 2005). Also, their status in society, inability to discuss sexual issues with partners and the social unacceptability of female autonomy may play a role in increasing women's risk of HIV infection (Amaro 1995; Meekers and Calves 1997; Pulerwitz et al. 2002).

The initial focus on male condoms as an effective HIV prevention tool has been challenged as real-world experience has shown that significant challenges exist to ensuring consistent protected sex, especially among women in developing countries (Gollub 2006). The potential for cervical barrier methods to protect women from HIV infection is currently being explored with a range of products and in a variety of settings (Moench,

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Chipato, and Padian 2001). As well as the protective potential that these cervical barriers may deliver, the fact that they are female-initiated is believed to contribute to enhancing safe sex for women, increasing women's bargaining power and enhancing women's control over their bodies.

Given that women's limited relationship power increases their risk of HIV infection (Dunkle et al. 2004; Pettifor et al. 2004; Pulerwitz et al. 2002; Zierler and Krieger 1997), there has been a focus on the development of female-initiated barrier methods for HIV prevention. The female condom is already available for use in South Africa after a national roll out scheme, but access remains limited for most women (Mantell, Scheepers, and Karim 2000; Warren and Philpott 2003). Many current HIV prevention trials therefore focus on new female-controlled methods such as diaphragms and candidate microbicides (Minnis and Padian 2005; Rosenberg and Gollub 1992). A diaphragm is a shallow, dome-shaped rubber disk with a flexible rim that fits within the vagina to cover the cervix. Although traditionally used for pregnancy prevention, the diaphragm is also being potentially considered for protection against HIV (Moench, Chipato, and Padian 2001). Microbicides are compounds formulated as gels, creams, foams or tablets that are inserted into the vagina (often with an applicator) to provide HIV protection (Ramjee et al. 2001). Female-initiated methods of HIV prevention have been particularly emphasised for women in long-term relationships in which the use of male condoms is acknowledged to be challenging (Lansky, Thomas, and Earp 1998; Macaluso et al. 2000). The use of all female-initiated barrier methods allows for women to instigate method use while the ability to use some of these methods covertly has been highlighted as a particular advantage for women.

This paper reports on findings from focus group discussions (FGDs) held with South African women aged 18–50 years to establish their understanding and feelings about attributes of female-initiated barrier methods for HIV prevention, with specific attention to the ability to use these methods covertly.

Methods

Recruitment

Focus group discussions were conducted with women aged 18–50 years from three areas in Eastern Johannesburg, South Africa. The areas were selected to represent different levels of socio-economic stratification in South African society: one consists primarily of site and service schemes[1] and informal settlements (Community A in Table 1), the second, an area with a mix of public housing, private housing and informal settlements (Community B) and the third with mainly upmarket private housing (Community C). We followed a three-stage process of (1) preparation; (2) contact and (3) follow-up in conducting the research (MacDougall and Fudge 2001). This involved making contact with local community representatives prior to the research and culminated in a report-back of findings from the broader research study, which included administration of a questionnaire as well as the qualitative data collection reported here. For this qualitative component of the study, women were purposively sampled to ensure representation by age group, language and socio-economic status and asked to participate in a study about methods for HIV prevention. Selection by socio-economic status was made by selecting across all communities and constructing groups that cut across socio-economic status. Women were approached in a local clinic and contacted door-to-door, where they were invited to participate in FGDs at a local community facility. Female field staff conducted the recruitment and accommodated working women by recruiting in the evenings when in the community.

TCHS 380523—3/4/2009—RANANDAN—333277—Style 1

Table 1. Overview of study participants by age group.

	Younger (18–29 years) $n = 46$	Older (30–50 years) $n = 51$	Total $n = 97$
Mean age (years)	23	39	31
Mean number of children	1.0	3.0	2.0
	(%)	(%)	(%)
Location			
Community A	28	38	33
Community B	47	31	39
Community C	25	31	28
Partner type			
Husband	2	48	26
Regular	53	28	40
Casual	43	18	30
One-off	2	6	4
House type			
RDP	13	16	14
Privately owned house	41	32	36
Outside room	4	6	5
Shack	26	26	26
Municipal house	17	18	18
Missing		2	1
Employment status			
Employed full time	4	14	9
Employed part time	6	6	6
Self employed		6	3
Student/scholar	23		11
Unemployed	62	54	58
Housewife		18	9
Other	4	2	3
Educational attainment			
Primary incomplete		8	4
Primary complete	2		1
Secondary incomplete	49	76	63
Secondary incomplete + vocational	6	6	6
Secondary complete	36	8	22
Tertiary incomplete	6		3
Tertiary complete		2	1

Focus group discussions

Women who agreed to participate were stratified into two age bands: 18–29 years and 30–50 years. This age stratification aimed to capture differences in women's life stages and to facilitate open discussion among women of the same generation. Four topics around preferences for barrier methods and their potential distribution were discussed: the manner in which products could be described to others; potential product distribution points; and potential promotional messaging and use with different types of partners. Condoms (female and male), microbicides and diaphragms were each discussed in separate groups. Eight FGDs (condoms $n = 4$; diaphragms $n = 2$; microbicides $n = 2$) were held with between 10–15 women and were conducted in one of two local languages spoken in the area (either IsiZulu or SeSotho). More groups were conducted on condoms as these are available barrier methods of HIV prevention and to cover both male and female condoms.

TCHS 380523—3/4/2009—RANANDAN—333277—Style 1

The FGDs were conducted at a central community venue, were between two and three hours long and participants were reimbursed ZAR50.00 and refreshments for participation. Focus group discussions enable a process of participant reflection in the discussion, such that each individual's views and opinions become sharpened and refined through interaction with the opinions and beliefs of other participants. Thus, the focus group is a reflection of a natural environment in which participants are influenced by one another (Finch and Lewis 2003; Kreuger and Casey 2000).

The difficulties associated with FGDs in developing countries are outlined by Maynard-Tucker (2000); namely lack of moderator experience, lack of moderator research background and poor language skills of transcribers. These issues were addressed through the use of moderators experienced in the collection of sexual and reproductive health data in South African settings. The second author oversaw all discussion groups with the assistance of a translator. To further ensure accuracy, the FGDs were tape recorded with participants' permission and later translated and transcribed into English by group moderators. Only female, local African language speaking moderators were used and notes were taken during each discussion group. After each discussion group moderators were debriefed to capture their impressions of the discussion, to highlight areas in which the discussion topics could be improved and to provide support to field workers if required. At either the start or end of the discussion groups, women completed a brief questionnaire to provide study staff with basic demographic information and limited information on their relationship status. In discussions particularly focused on microbicides and diaphragms, information about the products was provided, participants were shown prototypes and questions were fielded. This was to provide the women with some degree of product familiarity before the discussions, given that microbicides are not yet publicly available and that diaphragms are no longer provided as contraceptive measures in South African public clinics. Participants were informed of this and asked to discuss hypothetical products with HIV prevention efficacy.

Informed consent was obtained from all participants prior to beginning the discussions and the study was approved by the Human Research Ethics Committee (Medical), University of the Witwatersrand, South Africa and by the London School of Hygiene and Tropical Medicine Ethics Committee.

Analysis

All FGDs were transcribed and translated into English in a single step for analysis using Atlas.ti. Translation and transcription was conducted by the group moderators and checked against the FGD notes by an additional field worker. The analysis was also conducted through frequent discussions between the first two authors and through the field worker debriefing process described above. The analysis was conducted using framework analysis (Pope, Ziebland, and Mays 2000). Essentially five steps were followed in analysis of the FGDs: (1) familiarisation; (2) identification of a thematic framework; (3) indexing; (4) charting; and (5) mapping and interpretation.

Results

Participant characteristics

Ninety-seven women participated in the eight FGDs. The size of focus groups ranged from 10 to 15 individuals, with a mean of 12 participants. Participants were equally recruited from the three participating communities. Women had a mean age of 31 years and a mean of 2 children each (range 0–7). Just under two-thirds of the women reported having started

TCHS 380523—3/4/2009—RANANDAN—333277—Style 1

but not completed secondary school, while an additional 22% reported having completed secondary education. Only one woman reported having completed tertiary education. In keeping with unemployment statistics for South Africa, 58% reported being unemployed and a further 11% reported being students. Less than 20% of women were employed in any capacity (full-, part-time or self-employed). The small number that were employed were largely engaged in domestic or service industry occupations or were volunteer health counsellors. Most women reported a regular sexual partner (40%) and slightly more women reported a casual partner than a husband (30 versus 26%), with large differences between the younger and older women. Only 4% of women reported one-off sexual partners (see Table 1).

Overarching themes

The discussion groups with women were characterised by three main themes that ran through all groups with women of all ages. First, the notion that partners generally dislike contraceptive and disease prevention methods; particularly where they believe that the method may alter their sexual experience. Women reported their unsuccessful or difficult experiences with getting their partners to use condoms and their perception that this dislike would be the same for other barrier methods:

> They won't accept it easily because even the condom they haven't accepted it. (30–50 years old, microbicide discussion)

Most women had some experience of attempting to engage partners in decision-making about condom use. Their discussions of other barrier methods were coloured by these experiences and informed by strategies they had used in negotiating condom use. Second, all discussion of men (and all partner types) was characterised by the assumption that men are unfaithful and untrustworthy. In most instances, women classified men as untrustworthy because of extra-relationship partners they were assumed to have. The phrase 'you don't know what this person is doing when you are not there' was the most common means of expressing the disquiet women feel about their partners' sexual behaviour. In keeping with this, women frequently blamed men for HIV and other sexually transmitted diseases. Other illustrations of the untrustworthiness of partners included fears that they would hide sexually transmitted diseases from their partners, deliberately infect women with HIV and other sexually transmitted infections and purposively sabotage barrier method use:

> When I use a condom as a female, I'm protecting myself from an unfaithful partner who pretends to faithful. (30–50 years old, condom discussion)

> I'll use it so that it can protect me from a disease that he brought with him. (30–50 years old, diaphragm discussion)

> You get into the climax feeling and ... you don't feel a thing. Because you're in that situation all he is thinking about is pushing to the side. He will end up pushing the condom aside and you won't even feel that it's been moved. (18–29 years old, female condom discussion)

A third thematic element was present in all groups; the perception that, within relationships and the broader community, requesting the use of protection was seen as being synonymous with being untrustworthy oneself. Numerous statements by women during discussions highlighted the social and relationship pressure they feel that they have to overcome to request condom or other prevention method use:

> Then another thing is that, let me talk about me. At first I didn't use a condom, but I got to a point whereby I also realised that I should use a condom, because I now know about the HIV/AIDS virus. And when you're supposed to tell your partner it gets hard, because he will ask why we

TCHS 380523—3/4/2009—RANANDAN—333277—Style 1

> should use a condom now and that maybe you're cheating on him and that there is no more trust in the relationship, do you see such things? (18–29 years old, condom discussion)

In the groups, women discussed strategies for using barrier methods in different relationships, access to barrier methods, attitudes towards new barrier methods and messages for promoting them. The covert use of barrier methods was raised by women in all discussion groups, although it was an insignificant part of the discussion in one of the condom discussion groups and was more likely in discussions focusing on diaphragms and microbicides, particularly since the possibility for covert use was one of the product attributes specifically addressed in terms of these products (see Table 2). From the discussions, attitudes about the covert use of HIV barrier methods could be divided into three distinct areas: support for complete covert use; advocating for delayed or inaccurate overt use; and full disclosure of method use. During all the discussions, it was common for women to conflate the HIV preventive ability of products to include pregnancy prevention. This was likely based on their experience with male condoms where dual protection is provided and reflects women's desire for products that address more than one reproductive health issue at a time.

Support for complete covert use

Complete covert use was raised in all discussion groups barring three of the four groups focusing on condoms. We hypothesise that the overt character of condoms (explicitly raised by women) may have prevented their contemplation of covert use in these particular discussions. Additionally, women were most likely to frame discussions of the advantages of covert use in their previous negative experience with requesting partners to use condoms.

Advocating for complete secrecy was most frequently premised on two factors: the belief that male partners would not be open to the use of new methods; and generalizations about male dislike of all or most HIV prevention devices:

> They won't accept it easily because, even the condom, they haven't accepted it. But if you know that you need to be safe you have to hide it from him because even the condom they haven't accepted it. They say it is the one that spreads AIDS. (30–50 year old, microbicide discussion)

> There are silly men out there and you wouldn't know what he is doing but he wants you to be with him alone. It's better if this can be my own secret alone because when I tell him he will refuse using it. (18–29 year old, microbicide discussion)

Table 2. Topics on covert method use by different focus group discussion categories.

Topics	Condom ($n = 4$)	Diaphragm ($n = 2$)	Microbicide ($n = 2$)
Full disclosure of use		x	x
Relationship doesn't require covert use	x	x	
Value of covert use	x	x	x
Women's options for managing covert use		x	x
Educating men for buy-in	x	x	x
Half truths for male buy-in	x	x	x
Characteristics of method making covert use impossible	x		x
Characteristics of method making covert use possible		x	
Negative potential outcomes of covert use		x	

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Women noted an appreciation for the potential to use female-initiated barrier methods (diaphragm and microbicide) as covert back up should their attempts to initiate condom use fail. In discussions of covert use, women suggested that this method of managing barrier methods might be dependant on the character of each individual partner, indicating that they might chose covert use if their partner was known to be 'stubborn' or 'silly' about HIV or pregnancy prevention methods. Women liked the idea of having a back up method that they could control and which would still offer them protection should condom negotiations be unsuccessful:

> I think it is better if you don't tell him. As long as you know that you are using this, even when he says he wants a baby and you don't want one then you can use this. If the day you feel like you want a baby you can stop using it. (30–50 year old, diaphragm discussion)

> Personally I feel the gel is right because some of our partners, we don't know what they are doing when they are not home. For men it is not easy to use a condom and for me, I will be able to hide it from him and protect myself while I am using a condom. (30–50 year old, microbicide discussion)

In contrast to women advocating covert use as a means of overcoming particular partner characteristics, a small number of women expressed reservations about the need to discuss such matters with men at all. These women expressed the opinion that disease and pregnancy prevention were female issues and that it was therefore not necessary to have discussions about method use with male partners. Additionally women noted that disclosure of barrier method use could potentially be associated with social harms, which women felt might be avoided by maintaining covert use:

> Personally I don't see the need for them to know about this because I am protecting my life and if he went outside [the relationship] and did something, he doesn't tell you about it. (30–50 year old, microbicide discussion)

> I don't think you should tell a boyfriend because if you tell him and he walks out on you and never comes back, what then? (30–50 year old, diaphragm discussion)

Women were generally positive about their ability to use the methods covertly, particularly noting that men could be easily duped with lies to cover product use. They noted that there were numerous opportunities during sexual encounters for them to insert diaphragms and apply or reapply microbicide gels. Given that many of the women either lived apart from their partners or were at home while their partners were employed, it was common for women to discuss inserting barrier methods just prior to when their partners were expected home so that they were prepared for potential sexual encounters without having to disclose or negotiate time for product insertion. Acceptability of covert use was not particularly influenced by women's recognition of the potential for social and physical harms that might result from discovery. Indeed, these issues were only raised in a single diaphragm discussion group in which being abandoned or physically abused for deception were highlighted as the potential consequence of partners discovering that women had covertly used barrier methods:

> I think you should tell him because if he finds out he can even beat you for not telling him. So it is better if he knows, even if he beats you he will know [that you are using the method]. (18–29 years old, diaphragm discussion)

While acknowledgement of the usefulness of the potential for covert use was the most common response to discussions of microbicides and diaphragms, some participants were not comfortable with, or uncertain of, covert use. These participants were more likely to advocate considered covert use with some element of disclosure to partners.

TCHS 380523—3/4/2009—RANANDAN—333277—Style 1

Half-truths and overt use after the fact

The content of most FGDs (bar two) reflect women's discomfort with complete covert use but reflects the realities of assuring their own HIV protection in the face of male resistance. Women reported three distinct strategies they might consider using for wresting the power of HIV prevention decision-making from men without their full knowledge.

At one end of the scale of responses, women indicated their willingness to inform their partner of method use, but not to discontinue use if their partners disapproved. Here the potential for covert use was seen as serving women well when men were unreasonable or 'stubborn':

> You will have to tell him and listen what is his response then if he refuses you can use it without his knowledge. (18–29 years old, microbicide discussion)

Given that women's experiences of initiating condom use had been largely negative due to men's dislike of the method, many expected the same arguments with regard to new female-controlled barrier methods. To counteract the expectation of immediate negative male reaction some women advocated covert use as an initial strategy to gather evidence against male arguments of discomfort or excessive vaginal lubrication. To this end, some women suggested that covert use might offer an opportunity to test men and then argue for method use based on evidence from this experience:

> I would tell him after sex ... I would ask him if he felt something different and if he says no then I'll tell him about it and I'll say we must use it because you didn't even feel it is inside. (18–29 years old, diaphragm discussion)

Finally, drawing on the notion of men as easily duped, women across most discussion groups discussed the potential for using half-truths to explain the use of female-controlled methods, rather than disclosing their true purpose. To this end they discussed providing male partners with incomplete or inaccurate information that men were unlikely to dispute. Some participants spoke of previous experience with informing men that they are unable to use hormonal contraceptive methods and thereby getting their partners to use condoms (many men were reported as being against the costs of further children). The suggestion was made that diaphragms and microbicides could also be promoted as family planning methods, thereby ensuring that men who didn't want more children would be open to their use:

> The thing that can make him change is he is afraid of children. I said that the doctor said I shouldn't drink pills and now I must use condoms, because he is afraid that I will get pregnant. He says that the support [of children] is too much because he should buy food. He ... uses it [condom] because he is afraid of support. He says it is too much. (30–50 years old, condom discussion)

Other women suggested using men's discomfort with 'women's health issues' to inform their partners that methods were for treatment of mysterious gynaecological health issues and to thereby provide a medically sanctioned justification for the use of new barrier methods:

> I think if we make our secret what if he finds out. I think as this it is our secret we have to lie about it and say that the doctor said you should use this tube because you have a womb problem. So when he sees it he won't be angry or shocked. (30–50 years old, microbicide discussion)

Full disclosure of barrier method use

Across all discussion groups there were a small number of women who expressed their discomfort with any covert use of female-initiated barrier methods. In both diaphragm and

TCHS 380523—3/4/2009—RANANDAN—333277—Style 1

microbicide discussion groups, a minority of women argued against covert use. Reasons for informing partners ranged across discomfort with lying or omitting to inform partners about method use, acknowledgement of good relationships in which communication about such matters and joint decision-making were the norm and more overt feelings of the need for women to protect themselves against HIV in spite of potential relationship consequences such as abandonment or violence:

> I think if you talk to each other and he tells you to prevent you'll introduce that gel to him and he will like it because you won't fall pregnant and you won't get diseases. (18–29 years old, microbicide discussion)
>
> I would tell my partner because most of the time I tell him everything. You have to communicate. So if he likes it or not as long as you told him and it's up to him whether he accepts it or not. (18–29 years old, microbicide discussion)
>
> [addressing partner] Listen here, I don't beg you and I'm not scared of you. There are girls who are in a relationship that is abusive, I don't stick around for nonsense, I don't beg. So it's like that, I would tell him. I tell it like it is, I don't beg. It should end if it's time for our relationship to end ... So I'm talking on behalf of others who are scared of dumping their boyfriends, she's even afraid of saying I don't love you anymore. So, what more to tell him that I'm scared that you might infect me with HIV/AIDS and it's like that. (18–29 years old, condom discussion)

Such statements were not uncontested in the discussions; other women in their groups argued strongly against the need for full disclosure. In such instances women were likely to acknowledge that disclosure of method use was only possible with particular types of men/partners or among women who were particularly empowered, as illustrated by the quote above. Indeed, the response to the comment above showed that many participants in these groups felt unable to advocate strongly for their health and admired women who had such ability.

Discussion and conclusion

Discussions with women in Johannesburg, South Africa showed that many women have had negative experiences with negotiating HIV and pregnancy prevention methods with their partners. This is particularly true of methods that men believe will affect their sexual experience. Women we spoke with expected to have many of the same difficulties with using new female-initiated barrier methods, such as microbicides and diaphragms, but there were mixed responses to covert use of such methods. Despite the opportunity for women to use female-initiated barrier methods covertly, a growing body of evidence from clinical trials suggests that women demonstrate a desire to inform their male partners of their method use (Mantell et al. 2005; Weeks et al. 2004; Woodsong 2004). Although women often choose to disclose method use to their partners, partner dislike of female initiated methods has been linked to discontinuation of use in a range of studies (Beksinska et al. 2001; Ramjee et al. 1999; Rustomjee et al. 1999) and partner acceptability has been shown to affect product use (Jones et al. 2008). A study in Zimbabwe noted that consistent diaphragm use was associated with secret or discrete use (van der Straten et al. 2005), although women's desire for secret use varies considerably (Barnett 2000). While men frequently support the use of female initiated methods, in Uganda and Zimbabwe these methods have been found to cause male partners some degree of anxiety (Moon et al. 2002; Pool et al. 2000).

There has been limited opportunity to study issues of covert use outside of clinical trials, given that both microbicides and diaphragms are not generally available. There is

TCHS 380523—3/4/2009—RANANDAN—333277—Style 1

some evidence from discussions of general use that women are able to practice some degree of covert female condom use, specifically when partners are drunk or high.

Among these South African women, discussions of covert barrier method use were framed in a context of: male partner dislike of existing barrier methods and an expectation of the same dislike for new methods; concerns about male partner fidelity; and a fear of appearing untrustworthy when raising concerns about HIV prevention. Women's preference for overt or covert use of female-initiated methods was mediated by three specific factors: (1) the ability they had within relationships for open communication about family planning and disease prevention; (2) the attitudes of specific partners; (3) and their experience with men not taking responsibility for children and therefore, a belief that they would not take responsibility for disease. One would expect there to be some paradox in introducing methods for covert use into long-term relationships characterised by trust – although this was not found to be the case among these women. Women acknowledged that requesting the use of such a method might be construed as indicating their lack of trustworthiness, although there was a generally accepted theme of men being untrustworthy.

While the introduction of new female-initiated barrier methods for HIV prevention are developed in a context of limited female autonomy, their use and acceptance by women is a first step in challenging existing gender norms (Mantell et al. 2006). However, given that challenging existing gender norms and societal structures that increase women's HIV risk are long-term strategies and that many women may lack the motivation, opportunity or resources to challenge such norms, female barrier methods must be accommodated, at least initially, within existing norms. The strategies outlined by women in these discussion groups provide concrete examples of the manner in which women manage the patriarchal bargain (Kandiyoti 1988) in their pursuit of HIV protection, recognising that each woman may have a different mix of relational, socio-cultural, structural and prevention factors (Gollub 2006). Rather than challenging gender norms overtly, these women discussed strategies that are more subtle in their challenge to the patriarchal bargain but which have the potential to allow women control over their own sexual health.

There is the expectation that challenging gender roles is an overt expression of female power (Yoder and Kahn 1992), yet these discussions with women show that challenging gender norms may be more subtle. While the information generated from these discussions with women in Johannesburg are not generalisable to all women, they illustrate the need to think innovatively about assisting women with strategies that help them use new female-initiated barrier methods, rather than concentrating on covert use as one of these methods' most important attributes. It is apparent from these discussions with women that the ability to use female-controlled barrier methods covertly will have varying importance for different women in different relationships. For some women the potential for adverse outcomes when disclosing product use may overwhelm the potential for similar adverse outcomes should they fabricate a reason for product use or use the method covertly. This is part of each woman's individual decision-making for HIV prevention. Whatever the strategies that women choose to use once new female-initiated barrier methods such as the microbicide or diaphragm are available, healthcare providers need to provide support to women across a range of decisions about disclosure of method use to partners.

Note

1. The South African Reconstruction and Development Plan makes provision for a range of public housing schemes. Site and service schemes allocate land on which residents initially construct shack dwellings with the proviso that permanent dwellings are constructed within a stipulated time period.

TCHS 380523—3/4/2009—RANANDAN—333277—Style 1

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TCHS 380523—3/4/2009—RANANDAN—333277—Style 1

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Résumé

En Afrique sub saharienne, les femmes sont fortement exposées aux risques de contamination par le VIH et peuvent avoir du mal à négocier l'usage du préservatif. Cette situation a poussé à la focalisation sur le développement de méthodes de barrière à l'initiative des femmes, telles que le préservatif féminin, les microbicides et le diaphragme. L'un des avantages de ces produits est leur contribution au renforcement de la capacité à agir des femmes, grâce à certaines de leurs caractéristiques qui facilitent leur utilisation secrète. Nous avons employé la méthode des groupes de discussion thématique pour aborder l'usage secret des méthodes de barrière dans un échantillon de femmes sud africaines âgées de 18 à 50 ans vivant à Johannesburg Est. Il ressort des discussions que les attitudes de ces femmes par rapport à l'usage secret des méthodes de prévention du VIH sont influencées par la question écrasante de l'aversion des hommes pour ces méthodes, ainsi que celles de la prévention des grossesses, la perception d'un faible niveau de fiabilité des hommes et les interprétations sociales de la fidélité féminine. Les opinions parmi ces femmes sont très diverses en ce qui concerne l'usage manifeste ou secret des méthodes de barrière pour la prévention du VIH, et subissent l'influence des caractéristiques des partenaires et des expériences précédentes de contraception et de prévention du VIH. Les discussions indiquent que la remise en question des normes de genre dans le champ de la prévention du VIH est possible de manière assez subtile pour prendre en compte les relations individuelles des femmes et leur expérience de la négociation de la prévention, à la fois du VIH et des grossesses.

Appendix 5. Attribute identification workshop tool

Worksheets for Focus Group Discussion

23 July 2005

Prioritising Attributes

Participant Identifier:

Session: _____

Letter: _____

Introduction:

Today we will be working through some exercises to help us understand how you make decisions about using or not using products to prevent HIV infection. We will first work through many pages of exercises individually, then we will discuss some of the questions in a group. Please remember, there are no right or wrong answers, we are interested in your opinions, and please ask any questions you have.

Today we are going to discuss all types of barrier methods: male condoms, female condoms, microbicides and the diaphragm. I am sure you are all familiar with male condoms. We will tell you a bit more about the other methods.

Firstly the female condom: *pass around.* The female condom exists and is available in some clinics and shops. It provides good protection against HIV, STI and pregnancy. It can be put in for up to 6 hours before sex, and can be kept in for a total of 6 hours. Although it is recommended that a new female condom is used for each round of sex, the female condom is strong and can be reused for up to 7 times with the same partner. Then it needs to be washed carefully with soap and water and patted dry. The outer ring can sometimes slip inside the vagina, and some people say they can hear the female condom move while they have sex.

The Diaphragm, *pass around,* is a method that has long been used for pregnancy prevention and has shown to prevent some STIs. It is currently being tested to see if it provides any protection against HIV infection. The diaphragm can be kept in the vagina for up to 24 hours at a time, so can be inserted anytime before sex. It must be left in place for at least 6 hours after sex. A diaphragm can be used for up to 2 years if cared for properly. This means that care is taken when removing it, not to pierce it with a long finger nail, and to wash it with soap and water and store it in its box. However lubricant is needed each time it is used. They are also developing a disposable diaphragm and a one-size fits all diaphragm. The diaphragm you see here needs to be fitted by a health care worker.

Microbicides are a gel that are being tested to see if they can reduce women's risk of becoming HIV positive. They are also being tested to see if they can prevent some STI. A number of different types of microbicides are being tested. Some might reduce a woman's chance of becoming pregnant, some may not. Some will come in a pre-filled applicator, that will need to be thrown away after each use, others will come as a re-usable applicator with a tube of microbicides. The re-usable applicator will need to be washed after each use and refilled before each use. Some formulations will need to be inserted right before sex, some will last for an

hour, and some will last for 24 hours. The gel may make the vagina a little bit more moist (wet). Some women like this effect, while others do not.

We are here today to understand the best way to introduce these new methods. We want to know how you decide to use a method, which factors make it easier or more difficult to use them with your partners. We will be looking at characteristics of the product, ways to make them accessible to you, and ways to advertise and promote them.

There is a lot to cover, so please do not get tired, and we hope you enjoy the exercises.

Background information

a. Where do you live? ☐ Spruitview ☐ Vosloorus ☐ Zonkizizwe

b. How old are you? _____

c. How many children do you have? _____

d. What is the highest level of education you have obtained?
- ☐ None
- ☐ Went to school but did not complete primary
- ☐ Completed primary
- ☐ Incomplete secondary
- ☐ Incomplete secondary but some vocational training
- ☐ Completed secondary
- ☐ Incomplete tertiary
- ☐ Completed tertiary

e. What is your employment status:
- ☐ Employed full time
- ☐ Employed part-time
- ☐ Self employed
- ☐ Student/scholar
- ☐ Work seeker / unemployed
- ☐ Housewife
- ☐ Other Specify_____

f. What kind of partner was the last person you had sex with?
- ☐ Husband
- ☐ Other regular
- ☐ Casual
- ☐ One-off

g. Does this person live in the same house as you do? ☐ Yes ☐ No

h. What kind of house do you live in?

- ☐ RDP
- ☐ Municipal house (ama 4 rooms)
- ☐ Big house
- ☐ Room inside
- ☐ Train house (attached)
- ☐ Double house
- ☐ Hostel
- ☐ Hostel – family unit
- ☐ Flat
- ☐ Townhouse
- ☐ New house (bond house)
- ☐ Room outside
- ☐ Shack

i. In your house, how many rooms are used for sleeping? _____

j. How many people sleep in your house? _____

Physical attributes

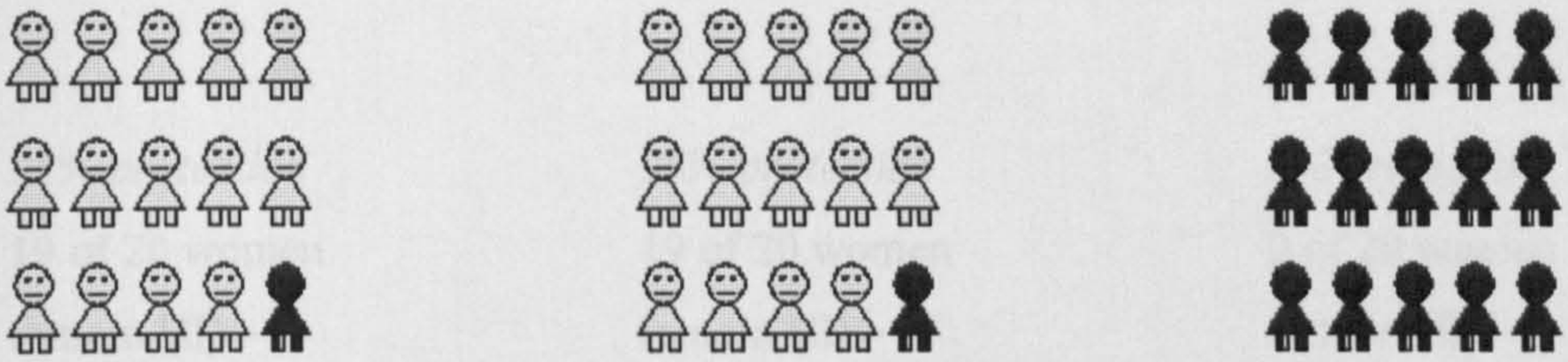
Attributes	4 most important attributes Mark with X	Ranking of importance: 1,2,3,4 1 = most important, 4 = least important
HIV prevention: Slight protection, medium protection, high level of protection against HIV		
Pregnancy prevention: No pregnancy prevention, some prevention, high level of pregnancy prevention		
STI prevention: Does it protect against other sexually transmitted diseases.		
Comfort: Can you feel it when you are using it? Yes, No		
Secrecy: Can your partner feel it when you are using it? Yes, No		
Reliability: Can it break, or slip?		
Side effects: Rash		
Upkeep: Washing with soap and water		
Insertion and removal time: When to insert, how long before removal		
Ease of use: How easy it is use to use, apply		
Sound: Does it make any noise during sex?		
Re-usable or disposable: Re-usable would need washing and possibly refilling, disposable would be thrown away after each use or round.		
Vaginal wetness: May make the vaginal a bit wetter		

HIV efficacy levels

Please note: Yellow dolls are HIV-, Red dolls are HIV+.

a. If a condom provides 95% protection against HIV, the diaphragm provides *95%* protection, and using neither provides 0% protection, would you use a condom, the diaphragm, or neither?

Male condom___ Diaphragm _____ Neither _____



95% protection

19 of 20 women

remain HIV-

95% protection

19 of 20 women

remain HIV-

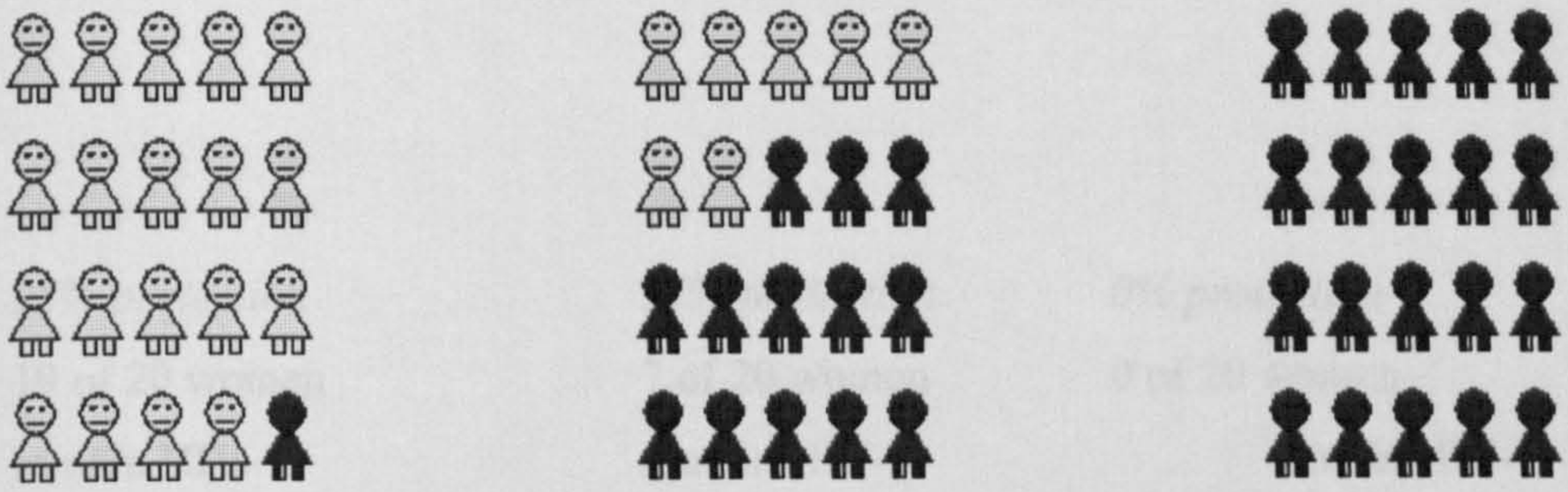
0% protection

0 of 20 women

remain HIV-

b. If a condom provides 95% protection against HIV, the diaphragm provides *35%* protection, and using neither provides 0% protection, would you use a condom, the diaphragm, or neither?

Condom_____ Diaphragm _____ Neither _____



95% protection

19 of 20 women

remain HIV-

35% protection

7 of 20 women

remain HIV-

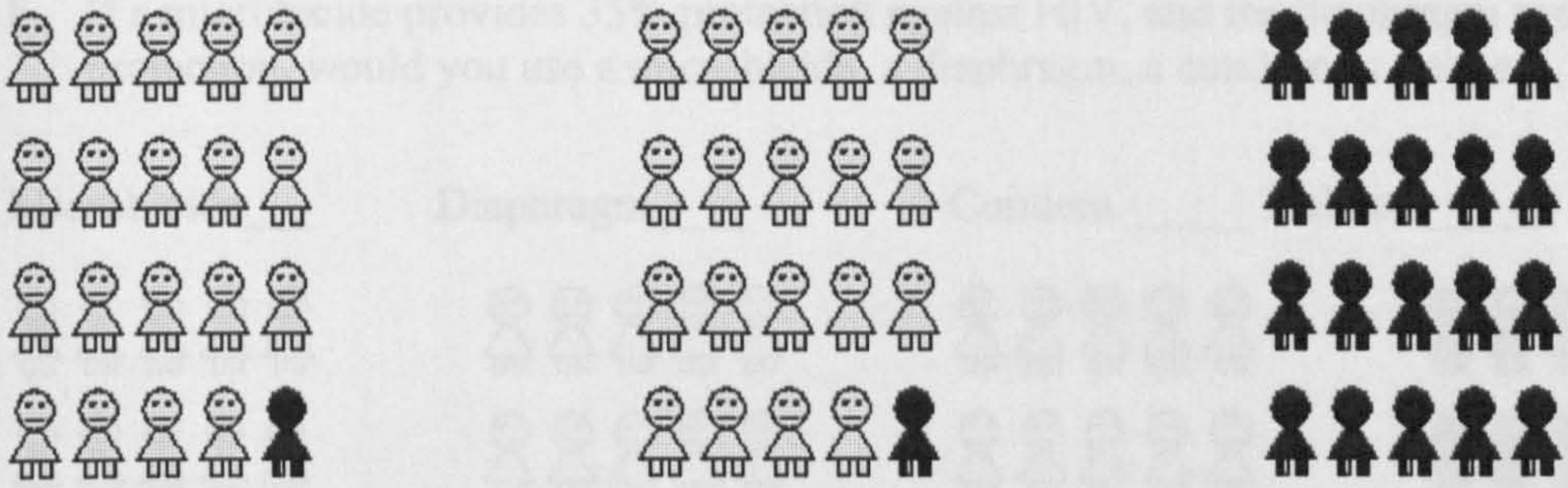
0% protection

0 of 20 women

remain HIV-

c. If a condom provides 95% protection against HIV, a microbicide provides *95%* protection, and using neither provides 0% protection, would you use a condom, a microbicide, or neither?

Condom_____ Microbicide ___ Neither _____



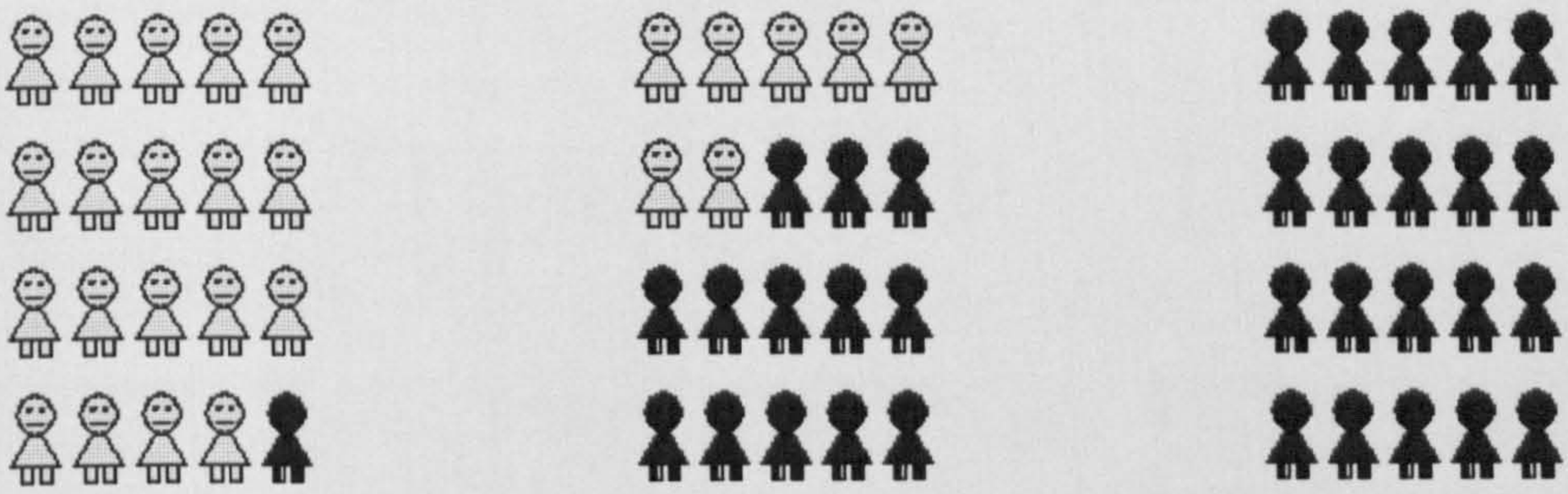
95% protection
19 of 20 women
remain HIV-

95% protection
19 of 20 women
remain HIV-

0% protection
0 of 20 women
remain HIV-

d. If a condom provides 95% protection against HIV, a microbicide provides *35%* protection, and using neither provides 0% protection, would you use a condom, a microbicide or neither?

Condom_____ Diaphragm _____ Neither _____



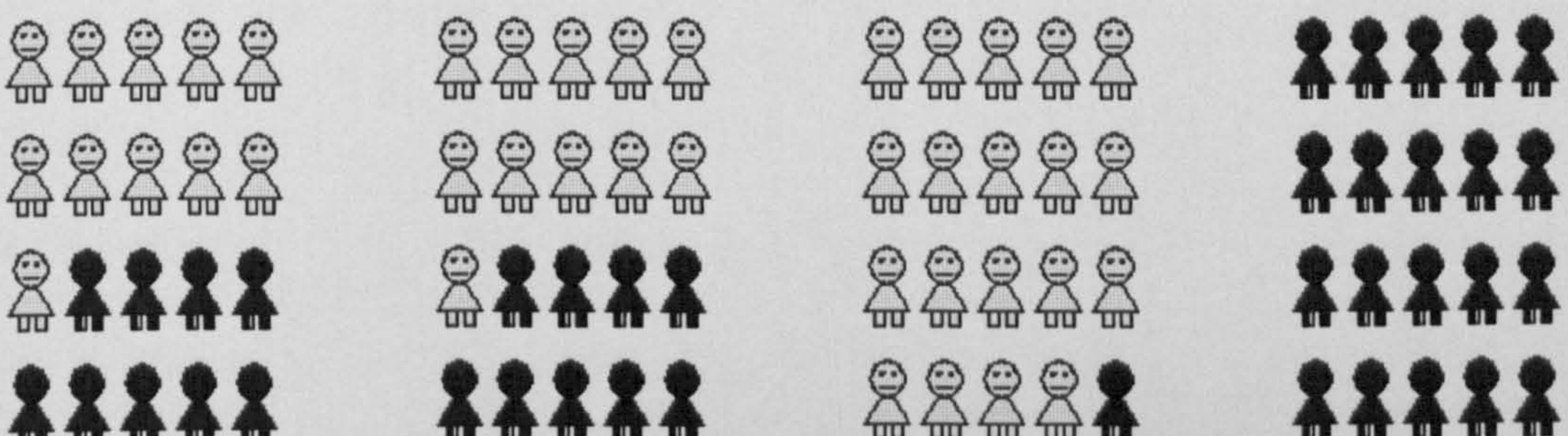
95% protection
19 of 20 women
remain HIV-

35% protection
7 of 20 women
remain HIV-

0% protection
0 of 20 women
remain HIV-

e. If a microbicide provides 55% protection against HIV, and the diaphragm provides 55% protection, would you use a microbicide, a diaphragm, a condom or neither?

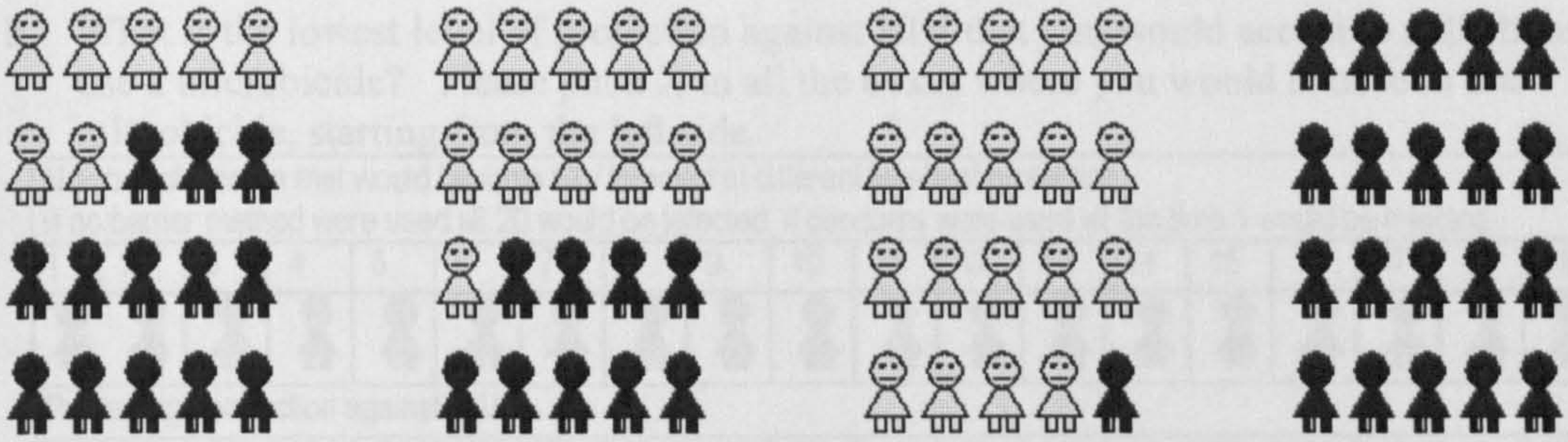
Microbicide___ Diaphragm ___ Condom _____ Neither _____



55% protection	*55% protection*	*95% protection*	*0% protection*
11 of 20 women	11 of 20 women	19 of 20 women	0 of 20 women
remain HIV-	remain HIV-	remain HIV-	remain HIV-

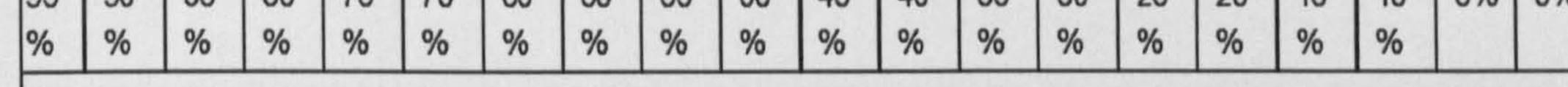
f. If a microbicide provides 35% protection against HIV, and the diaphragm provides 55% protection, would you use a microbicide, a diaphragm, a condom or neither?

Microbicide___ Diaphragm____ Condom _____ Neither _____



35% protection	*55% protection*	*95% protection*	*0% protection*
7 of 20 women	11 of 20 women	19 of 20 women	0 of 20 women
remain HIV-	remain HIV-	remain HIV-	remain HIV-

g. What is the lowest level of protection against HIV that you would accept to still choose to use a microbicide? Please put a X in the boxes where you would choose to use a microbicide, starting from the right side.

Number of women that would remain HIV negative at different levels of protection. If no barrier method were used no women would remain HIV negative, if condoms were used all the time 19 would be remain HIV negative																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
																			
Percentage protection against HIV																			
5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%

h. What is the lowest level of protection against HIV that you would accept to still choose to use a microbicide? Please put a X in all the boxes where you would choose to use a microbicide, starting from the left side.

Number of women that would become HIV infected at different levels of protection. If no barrier method were used all 20 would be infected, if condoms were used all the time 1 would be infected																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Percentage protection against HIV																			
95 %	90 %	85 %	80 %	75 %	70 %	65 %	60 %	55 %	50 %	45 %	40 %	35 %	30 %	25 %	20 %	15 %	10 %	5%	0%

i. What is the lowest level of protection against HIV that you would accept to still choose to use the diaphragm? Please put a X in the all boxes where you would choose to use a diaphragm, starting from the right side.

Number of women that would remain HIV negative at different levels of protection. If no barrier method were used no women would remain HIV negative, if condoms were used all the time 19 would be remain HIV negative																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
																			
Percentage protection against HIV																			
5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%

j. What is the lowest level of protection against HIV that you would accept to still choose to use the diaphragm? Please put a X in all the boxes where you would choose to use a diaphragm, starting from the left side.

Number of women that would become HIV infected at different levels of protection. If no barrier method were used all 20 would be infected, if condoms were used all the time 1 would be infected																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
																			
Percentage protection against HIV																			
95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%	40%	35%	30%	25%	20%	15%	10%	5%	0%

k. How long before sex would you like to insert a diaphragm or a microbicide? _____

l. Is time to insertion important to your decision to use one of these methods? Yes __ No__

m. Do you prefer a product that you throw away after 1 single round, or one that is reusable that would need to be washed and refilled? Single use _____ Reusable _____

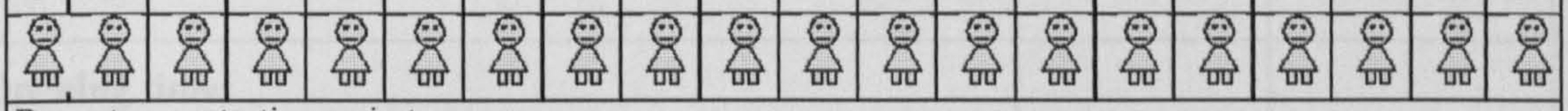
n. Did you use a male or female condom the last time you had sex? Yes ___ No___

o. If you heard that one of your friends developed a rash after using the microbicide or the diaphragm, would you still try it? Yes ___ No___

Pregnancy prevention levels:

Do you want a method that also prevents pregnancy? Yes_____ No _____

If No: How much prevention against pregnancy would you accept to still use a method to prevent HIV? Please mark with an X all the levels that you would accept to use a method of HIV prevention.

Number of women out of 20 that would become pregnant. If no barrier were used all 20 women would become pregnant, if condoms were used all the time 1 woman would be become pregnant																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
																			
Percentage protection against pregnancy																			
95 %	90 %	85 %	80 %	75 %	70 %	65 %	60 %	55 %	50 %	45 %	40 %	35 %	30 %	25 %	20 %	15 %	10 %	5 %	0 %

Distribution attributes

What are the 3 most important things that influence your decision to get barrier methods?

	3 Most important Place X	Ranking of 3 most important (1-3) 1= most important
Type of facility general: Medical facility or not medical facility: ▪ Medical (clinic, GP, Pharmacy, hospital, etc..) ▪ Not medical (shop, hairsalon, supermarket, public toilets, bottle store, hotel, taxi rank)		
Type of facility (specific): Clinic, hospital, shop, pharmacy, hair salon, garage, pharmacy, supermarket, public toilets, bottle store, shabeen, hotels, private GP, home delivery, police station, taxi rank, spaza shop, etc..		
Method for collecting product: ▪ From a box / machine in a discrete location ▪ In public from a person behind a counter (clinic receptionist/ shopkeeper/ pharmacist/ etc..) ▪ In a private room from a person.		
Reliability of supply: When I get to the facility I can *Always, Sometimes, Rarely* find my product.		
Opening times		
Waiting times		
Distance: walking distance ½ hour, 1 hour, 1 taxi, 2 taxis		
Privacy:		
Characteristics of person to assist you : Age, sex, friendliness, expertise.		
Frequency of having to collect product supplies:		

Channel preferences

What are the 2 *most* likely place for you to collect your barrier methods? What are the 2 *least* likely places for you to collect your barrier methods?

	2 **most** likely places to go to get barrier methods	2 **least** likely places to go for barrier methods
Clinic		
Private GP		
Family Planning		
Library		
Garage		
Pharmacy		
Supermarket		
Public toilets		
Public Phones:		
bottle store:		
Shabeen:		
Hair salon:		
Work places:		
Schools in the classrooms:		
Hotels:		
Hospitals:		
Nightclubs		
Home delivery:		
Police station :		
Taxi ranks:		
Shops:		
Movies:		
In large gatherings:		
Awareness campaigns		

other distributional attributes

a. What is more important in your choice of HIV prevention method?	
Type of facility: _____ Clinic, hospital, shop, pharmacy, hair salon, garage, pharmacy, supermarket, public toilets, bottle store, shabeen, hotels, private GP, home delivery, police station, taxi rank, spaza shop, etc..	Method of collection _____ ▪ From a box / machine in a discrete location ▪ In public from a person behind a counter (clinic receptionist/ shopkeeper/ pharmacist/ etc..) ▪ In a private room from a person.

b. How important is reliability of supply to your choice of HIV prevention method?	
If I cannot find my preferred method the first time, I will use another method or not use any barrier method for HIV prevention? Choice _____	If I cannot find my preferred method the first time, I will go somewhere else to collect it or return another day? Choice _____

c. How important are opening hours to your choice of HIV prevention method?	
I can predict when I will need my product and be able to collect them within regular working hours? Choice _____	I need to be able to collect my product at different hours of the time and days of the week or I will not use that method? Choice _____

d. What is the longest you are willing to wait in line for your preferred HIV prevention product?
_____ minutes _____ hours

e. What is the furthest you are willing to travel for your preferred HIV prevention product?

30 minutes walk ___	1 hour walk ___	1 taxi ride ___	2 taxi rides ___

f. How important is privacy when requesting your preferred HIV prevention method?		
I would not collect it if I might be seen by others. Choice _____	I do not mind being seen by people like myself, but would not collect if there were many different people around. Choice_____ Please specify 'people like me': _____	I do not care who sees me collect it. Choice _____

g. How important is the person who would give you your preferred HIV prevention method?	
I would not collect it if I do not feel comfortable with the person Choice _____	I do not care who gives me my preferred method Choice _____

h. What is the most frequent you are willing to collect new product supplies?		
Twice per month __	once per month ___	once per 2 months ___
once per 4 months __	once per 6 months __	once per year __

i. In your current situation, what is the highest amount you would be willing to pay for a single use microbicide?

Rand _____ per protected sex act

j. In your current situation, what is the highest amount you would be willing to pay for a microbicide in a reusable applicator with a tube of gel?

Rand _____ per protected sex act

k. In your current situation, what is the highest amount you would be willing to pay for a diaphragm with gel that you could use for 2 years?

Rand _____ per protected sex act

l. In your current situation, what is the highest amount you would be willing to pay for a disposable diaphragm?

Rand _____ per protected sex act

Promotional messaging

a. If you wanted to use a microbicide or a diaphragm with your most recent partner, what would you tell him to make him most willing to accept your use of it? *Please mark in the column 'Best'* Which of these messages would he least likely to accept? *Please mark in the column 'Worst'.*

	Best	Worst
It prevents HIV		
It prevents pregnancy		
It prevents STI		
It is for a healthy vagina		
Its for a fresh vagina		
Its for vaginal hygiene		
It increases sexual pleasure		
It's a cool new sex toy		
It will protect my capacity to have children in the future		
My doctor told me to use it to stay healthy		
Something else: _____ _____		

b. If microbicides and the diaphragm were being advertised on the radio and TV, what message would make them most attractive for you and your partner to use? *Please mark in the column 'Best'* Which of these advertising messages would make them least attractive for you and your partner? *Please mark in the column 'Worst'.*

	Best	Worst
It prevents HIV		
It prevents pregnancy		
It prevents STI		
It is for a healthy vagina		
Its for a fresh vagina		
Its for vaginal hygiene		
It increases sexual pleasure		
It's a cool new sex toy		

It will protect women's capacity to have children in the future		
It keeps women healthy		
Something else: _____ _____		

Promotional images

a. HIV prevention: Which of the images below make you think of a product that prevents HIV and do you like best?

Choice _____

Choice _____

Choice _____

Choice _____

Choice _____

b. Pregnancy prevention: Which of the images below make you think of a product that prevents pregnancy?

c. Can you think of any other images that would bring pregnancy prevention to your mind (think of a picture to advertise a contraceptive)?

d What do these image make you think of? Would you try a product that looked like each of these? Would your partner agree to using a product like this?

	Healthy vagina	Fresh vagina	Vaginal hygiene	Increased sexual pleasure	A cool new sex toy	Would you try this?	Would you partner agree to using this?	Which are the 2 **most** attractive images that you and your partner would be **most** willing to use?	Which are the 2 **least** attractive images that you and your partner would be **least** willing to use?
									
									
									
									
									
									
									
									

From Real Products

	Healthy vagina	Fresh vagina	Vaginal hygiene	Increased sexual pleasure	A cool new sex toy	Would you try this?	Would you partner agree to using this?	Which are the 2 most attractive products that you and your partner would be most willing to use?	Which are the 2 least attractive products that you and your partner would be least willing to use?
A. Intimate Vaginal Cleanser: Rooibos & herbal extract									
B. Intimate Vaginal Cleanser: Tea Tree & herbal extract									
C. Intimate: personal lubrican									
D. Regard: lubricating Jelly Glycerine 6%									
E. K-Y Lubricating Jelly Glycerine 11,25%									
F. K-Y GEL Personal Lubricant									
G. at LAST for Women									
H. Afrodite libido gel for her									
						Would you try this?	Would you partner agree to using this?	From the below which is 1 most attractive	From the below which is the 1 least attractive
I. TRUST studded									
J. Lovers Plus coloured and flavoured (yellow box)									
K: Lovers Plus (purple box)									
L: Durex Performa: for longer lasting pleasure									
M. Contempo Rough Rider studded for extra sensation									

Appendix 6. Community survey tools

Appendix 6.1 Survey Instrument

Determinants of women's demand for barrier methods for HIV prevention

1	a. LOCATION	Zonkiziswe 1 Vosloorus 3 Spruitview 2	[ ]
	b. CLUSTER NUMBER		[ ]
	c. HOUSEHOLD NUMBER		
2	FLIPCHART VERSION		PLACE FLIPCHART VERSION STICKER HERE
3	SURVEY LANGUAGE		ISIZULU
4	INTERVIEW DATE		day [ ] month [ ]
5	INTERVIEWER NAME		[ ]
6	INTERVIEW START TIME		Hour [ ] Min. [ ]
7	HAS THE CONSENT FORM BEEN SIGNED?	No 0 Yes 1	[ ]

8	FIELD MONITOR WHO CHECKED SURVEY	NAME OR INITIALS	[ ]
9	FIELD EDITED BY:	NAME	[ ]
10	FIELD EDITED ON		day [ ] month [ ]
10	b. WAS THIS A PERFECT INTERVIEW?	No 0 Yes 1	[ ]
11	OFFICE EDITED BY	NAME	[ ]
12	OFFICE EDITED ON		day [ ] month [ ]
13	1st DATA ENTRY COMPLETED BY	NAME	[ ]
14	1st DATA ENTRY COMPLETED ON		day [ ] month [ ]
15	2nd DATA ENTRY COMPLETED BY	NAME	[ ]
16	2nd DATA ENTRY COMPLETED ON		day [ ] month [ ]

COMMENTS:

Sawubona igama lami ngingu .....
Siyabonga ngokusivumela ukuthi sikhulumisane nawe. Sicele ukukhuluma nawe ngoba sithanda ukuqonda ukuthi uzithatha kanjani izinqumo zokuvimbela i-HIV, ukusebenzisa kwakho ama-condom nezindlela zokuhlela nokuthi uzithola kuphi lama-products. Lokhu kuzosisiza kakhulu ukuthi sazi kangcono ngokuthi zingasatshalaliswa kanjani izindlela ezintsha zokuvembela iHIV ikakhulukazi ezenzelwe abantu besifazane. Okwamanje kunocwaningo olwenziwayo ekuhloleni ukusebenza kwama-products amasha, imicrobicides ne diaphragm; inikeza abesimame ekuvikelekeni kwi-HIV nezifo zocansi. Lama-product ahlolwayo azokwenzelwa abesimame ukuba afakwe esithweni sabo sangasese, kanti futhi ingeke yabasobala kumlingani wakhe. Kodwa akukaqiniseki ukuthi ngempela ziyavikela.kwi-HIV nasezifweni zocansi. Kanti kuyo lengxoxo yethu sizochaza kabanzi ngalamaproducts.

Lengxoxo yethu inezigaba ezine: Esokuqala sizothathanda ukwazi kabanzi ngawe nangomndeni wakho, esesibili sizothanda ukwazi kabanzi ngomlandu wakho ekusebenziseni ama-condom nezindlela zokuhlela umndeni nangenkathi owagcina ngayo ukuya ocansini. Isigaba sesithathu kunezimo okucatshangelwa kuzo lapho sizokucela khona ukuba ucabange ngezinqumo obungazithatha umangabe lama-products besetholakala. Emva kwengxoxo yethu sizocela uvo lwakho mayelana nalokhu esikuxoxile.

17

Sithanda ukukwazisa ukuthi konke okushoyo kuzogcinwa kuyimfihlo kanti futhi kuzocubungisiswa nokunye okuzoshiwo abanye ababandekayo kulolucwaningo. Khumbula ukuthi ayikho impendulo eqondile nenga qondile. Asikho lapha ukukwahlulela. Konke ozokusho kuzogcinwa kuyimfihlo. Unelungelo lokweqa nanoma yimuphi umbuzo ongathandi ukuwuphendula kanti futhi unelungelo lokunqamula lengxoxo nanoma isiphi isikhathi osithandayo.

Hello, my name is .....
Thank you for agreeing to have this interview with us. We have requested this interview to understand how you make your choices about HIV prevention, your use of condoms and contraceptives and where you go to obtain these products. This will help us learn about how best to distribute new methods for HIV prevention specifically made for women's use. Currently, there are research studies testing whether these new products, microbicides and the diaphragm, provide women any protection against HIV and other sexually transmitted diseases. The products that are being tested will be made for women to insert into their vagina before sex, and so might not be noticed by her partner. However, it is not yet known if they provide any protection against HIV and STD transmission. Further on in this interview we will tell you much more about these products.
This interview has 4 main parts: the first will ask some background questions about you and your household, the second part will ask about your history of using condoms and contraceptives and about the last time you had sex. The third part presents some imagined scenarios in which we ask you to think about the choices you might have made if these new products were already available. After the main survey questions we will ask for your feedback on what you thought of the interview.
We would like to let you know that your comments are confidential and will be analysed together with the contributions from other interviews. Remember there are no right or wrong answers. We are not here to judge you. All that you say will be kept secret. You have the right to skip any questions that you do not want to answer and the right to discontinue the interview at any time you wish.

Q	Questions	Codes	Responses	Skips
	SECTION 1: BACKGROUND INFORMATION			
18	Ngizothanda ukubuza ngomdeni wakho kanye nawe. I would like to start asking some general questions about your family and your own background.			
19	Ingabe uzalwe ngayiphi inyanga nonyaka? In which month and year were you born?	Unknown 98 Month a. Year b.	[ ] [ ]	98→Q21
20	a.WAS SHE BORN BEFORE OCTOBER 1959?	No 0 Yes 1	[ ]	1→ineligible
	b.WAS SHE BORN AFTER OCTOBER 1987?	No 0 Yes 1	[ ]	1→ineligible →Q23
21	Uneminyaka emingaki namhlanje? How old are you today?			
22	b. IS SHE BETWEEN 18 AND 45 YEARS OLDS (INCLUSIVE)?	No 0 Yes 1	[ ]	0→ineligible
23	Nikhuluma luphi ulimi ekhaya? What language do you speak at home?	English 1, Afrikaans 2, IsiXhosa 3, IsiZulu 4, SeSotho 5, SeTswana 6, SePedi 7, SiSwati 8, TshiVenda 9, ZiTsonga 10, isiNdebela 11, Other 96	[ ]	
24	Ningabayiphi inkoko? What religion do you belong to?	Born Again 1, Catholic 2, Protestant 3, Christian -unspecified 4, Jehovah's witness 5, 7th day Adventist 6, Traditional African 7, Hindu 8, Muslim 9, Shembe 10, Zionist 11, None 12, Other 96	[ ]	

Other 96
Don't know/ Don't remember 98
Refuse to answer 99

25	Manje sengizokubuza imibuzo embalwa ngezinga lakho lemfundo nokuthi yimiphi imithombo eletha imali ekhaya lakho. Ufunde wagcina kweliphi ibanga ngokwemfundo? I am now going to ask you some questions about your level of education and what sources of income there are coming into your household. What is the highest level of education you gained?	None 1 Incomplete primary 2 Completed primary 3 Incomplete secondary 4 Incomplete secondary & some vocational training 5 Completed secondary 6 Incomplete tertiary 7 Completed tertiary 8	[ ]	
26	Uneminyaka engakanani uhlala kulendawo? [THIS TOWNSHIP] How many years have you lived in this area?	Always 95	[ ] years	if > 5 Yrs → Q29
27	Bewuhlala kuphi phambi kokuba uzohlala kulendawo? Where did you live before moving here?	Gauteng 1 Eastern Cape 2 Free State 3 Kwazulu Natal 4 Mpumalanga 5 Northern Cape 6 Northern Province 7 North West 8 Western Cape 9 Other Country 96	[ ]	
28	Kwakuyidolobhakazi, idolobhana noma emakhaya noma ipulazi? Was this a large city, a town or a rural area/farm?	Large City 1 Town 2 Rural area/ farm 3	[ ]	
29	Ungasichaza kanjani isimo sakho maqondana nokuqashwa? Ingabe uqashwe okwesikhashana noma ngokuphelele; bewungumfundi, usafuna umsebenzi noma umgcini khaya. How would you define your employment status? Are you employed full-time or part-time, were you a student, a workseeker, a housewife?	Employed full time 1 Employed part-time 2 Student/scholar 3 Work seeker / unemployed 4 Housewife 5 Retired 6 Other 96 Specify_____	[ ]	1→Q31 2→Q31
30	Ukhona umsebenzi oke wawenza onyakeni odlule? During the past year, did you do any kind of work?	No 0 Yes 1	[ ]	0 →Q34
31	Chaza kafuphi uhlobo lomsebenzi omkhulu owenzayo noma obuwenza. WRITE RESPONDENTS ANSWER in (a) THEN CODE IN OFFICE (b) Describe briefly the main work or job that you do/did?	(a) _____ (b) Sales, services 1 Unskilled manual 2 Household/domestic 3 Manufacturing 4 Other 96	b [ ]	
32	Kulowo msebenzi ukhokhelwa noma bewukhokhelwa kanjani? Ingabe iholo olithola njalo, uyazisebenza, ukhokhelwa ngenani olukhiqizile, noma awuzange wakhokhelwa? In your main job, how are/were you paid? Is this based on a regular salary, self-employed, as a casual labourer, paid by the amount you produced, or unpaid?	Regular paid 1 Self-employed 2 Casual labourer 3 Paid per piece 4 Unpaid 5	[ ]	
33	Uwenzephi/ uwenzaphi lo msebenzi? Ekhaya lakho, endlini yomcashi, emgwaqeni, estolo, efemini, engadini, emayini noma kwenye indawo? Where does/did this work take place? Is this at your home, at your employer's house, on the street, in a shop/market/kiosk, in an office, in an industry/factory, in a plantation/farm/garden, in a construction/mine/ quarrying site or somewhere else?	At own home 1 At employers house 2 On the street 3 Shop/market/kiosk 4 Office 5 Industry/factory 6 Plantation/farm/garden 7 Construction/mines/quarrying sites 8 Other 96 Specify _____	[ ]	

34	**Manje sengizokubuza imibuzo embalwa maqondana nekhaya lakho. Ngekhaya sichaza umuzi qobo kanye nabantu ohlala nabo (ungaba wedwa noma ube nomndeni kanye nezihlobo). Kungaba yindlu noma ikhaya elinezindlu eziningi zandawonye, ngisho noma ngabe azisondelene kakhulu. Ikhaya lineqembu labantu, ekuvame ukuba yizihlobo, ababelana ngezinto ezahlukene futhi abavamise ukudla ndawonye.** I am now going to ask you some questions relating to your household. By household we mean the physical and social unit in which you live (either by yourself or with family and relatives). This could be a house or a compound consisting of different buildings that belong together, even though they may not be very close together. A household consists of a group of people, usually relatives, who share resources and regularly share meals		
35	**Ungathi ngubani inhloko yekhaya lakho?** **PROBE: Lomuntu uhlobene kanjani nawe?** Who would you say is the head of your household? PROBE: What is this person's relationship to you?	Self 1 Husband/partner 2 Child 3 Parent 4 Sibling 5 Son/daughter in law 6 Mother/father in law 7 Other- relative 8 Other-not a relative 96	[ ] 1→Q42
36	**Sizothanda ukukubuza imibuzo embalwa ngenhloko yekhaya osanda kuyisho** We would like to ask you some questions about the head of household who you just identified.		
37	**Ungasichaza kanjani isimo sokuqashwa senhloko yekhaya?** **Ingabe uqashwe okwesikhashana noma ngokuphelele; ingabe ungumfundi, usafuna umsebenzi noma umgcini khaya.** How would you definee the head of household's employment status? Is the head employed full-time or part-time, is the head a student, a workseeker, a housewife?	Employed full time 1 Employed part-time 2 Student/scholar 3 Work seeker / unemployed 4 Housewife 5 Retired 6 Other 96 Specify_____	[ ] 1→Q39 2→Q39
38	**Inhloko yekhaya ike yasebenza onyakeni odlule?** During the past year, did the head of household do any kind of work?	No 0 Yes 1	[ ] 0→Q42
39	**Chaza kafuphi uhlobo lomsebenzi obuwenziwa/owenziwa yinhloko yekhaya.** **WRITE RESPONDENTS ANSWER IN (a) THEN CODE IN OFFICE (b)** Describe briefly the main work or job that the head of household does/did?	(a) _____ (b) Sales, services 1 Unskilled manual 2 Household/domestic 3 Manufacturing 4 Other 96	b[ ]
40	**Ikhokhelwa noma beyikhokhelwa kanjani inhloko yalapha ekhaya?** **Ingabe yiholo alithola njalo, uyazisebenza, ukhokhelwa ngenani olukhiqizile, noma awuzange wakhokhelwa?** How is/was the head of household paid? Is this based on a regular salary, self-employed, as a casual labourer, paid by the amount you produced, or unpaid?	Regular paid 1 Self-employed 2 Casual labourer 3 Paid per piece 4 Unpaid 5	[ ]
41	**Ubuwenziwaphi/wenziwakkuphi lo msebenzi?** Where does/did this work take place?	At own home 1 At employers house 2 On the street 3 Shop/market/kiosk 4 Office 5 Industry/factory 6 Plantation/farm/garden 7 Construction/mines/quarrying sites 8 Other 96 Specify _____	[ ]
42	**a. Mangakhi amagumbi endlini yakho?** How many rooms are there in your house?		[ ]
	b. Mangaki amagumbi eniwasebenzisela ukulala ekhaya lakho? How many rooms in your household are used for sleeping?		[ ]
43	**Bangaki abantu abavame ukulala ekhaya lakho?** How many people usually sleep in your household?		[ ]

44	Nihlala endlini ewuhlobo olunjani? What type of housing do you stay in?	RDP 1 RDP extended 2 Hostel 3 Hostel family unit 4 Double house 5 New house 6 Bond house 7 Municipal/council house 8 Shack 9 Room inside 10 Room outside 11 Other 96	[ ]	
45	Ngubani ongumnikazi wendlu/wendawo ohlala kuyona? Who owns the house/place you live in?	Parent/parent-in-law 1 Private landlord 2 Government/council 3 Company 4 Self 5 Partner 6 Sibling 7 Other relative 8 Other–not a relative 96	[ ]	

Sithanda ukwazi ngesimo sakho sempilo, ngoba sidinga ukuqondisisa ukuthi ngabe lokhu kukwama kanjani izinqumo zakho. Khumbula ukuthi lolwazi onikela ngalo luyimfihlo kanti futhi luzosetshenziswa kulenhlolomvo ukukubeka esigabeni sesimo sempilo.

46 Ingabe ninazo lezinto ezilandelayo kulendlu enihlala kuyo:

We want to find out about your secio-economic standard, because we need to understand how this affects your choices. Please remember this information is confidential and will only be used by this study to place you in a socio-economic category.
Does your household have:

a. Ugesi Electricity	No 0	Yes, working 1 Yes, but not working 2	a[ ]
b. Iwayilense A radio	No 0	Yes, working 1 Yes, but not working 2	b[ ]
c. Umabonakude A television	No 0	Yes, working 1 Yes, but not working 2	c[ ]
d. Ucingo/ Umakhala ekhukhwini A telephone / cell phone	No 0	Yes, working 1 Yes, but not working 2	d[ ]
e. Ifiliji A refrigerator	No 0	Yes, working 1 Yes, but not working 2	e[ ]
f. Ikhompyutha A personal computer	No 0	Yes, working 1 Yes, but not working 2	f[ ]
g. Umshini woku washa A washing machine	No 0	Yes, working 1 Yes, but not working 2	g[ ]

47	Ingabe lekhaya linazo lezinto ezilandelayo: Does any member of your household own:			
	a. Sondombili A bicycle	No 0	Yes, working 1 Yes, but not working 2	a[ ]
	b. Isithuthuthu noma iskutha A motorcycle or motor scooter	No 0	Yes, working 1 Yes, but not working 2	b[ ]
	c. Imoto A car	No 0	Yes, working 1 Yes, but not working 2	c[ ]
	d. Izimvu noma izinkomo Sheep or cattle	No 0	Yes 1	d[ ]
48	Uma kukhona omunye endlini ogulayo kufuneka i-R100 yamakhambi noma yokumelapha, ungasho ukuthi *kulula kakhulu*, *kuludlana*, *kunzinyana* noma *kunzima kakhulu* ukuthola imali? If a person became ill in your home and R100 was needed to pay for treatment or medicines, how easy would it be for you to find the money: very easy, easy, quite difficult or very difficult?		Very easy 1 Easy 2 Quite difficult 3 Very difficult 4	[ ]

49	**Ingabe nihlala ndawonye nomlingani wakho wezocansi?** Are you currently living with a sexual partner?	No 0 Yes 1	[ ]	0→Q52
50	**Ungasho ukuthi imali oyiletha endlini noma emdenini *iningi* ukwendlula umlingani wakho ozwana naye noma *incane* noma icishe *ilingane*?** Would you say that the money that you bring into the family/household is: *more* than what your partner contributes; *less* than what he contributes, or *about the same* as he contributes.	More 1 Less 2 About the same 3	[ ]	
51	**Umlingani wakho ukhipha imali engakanani ukukhokhela izindleko zasendlini? Lutho, Uhalufu nesigamu, Okulingene, Ingxenye nohaful, Konke?** What proportion of the household expenses does your partner contribute? None, about one third, about half, about three quarters, all?	None 1 One third 2 Half 3 Three quarters 4 All 5	[ ]	
52	SECTION 2 REPRODUCTIVE HISTORY **Manje ngithanda ukubuza imibuzo mayelana nokusebenzisa kwakho izindlela zokuhlela umndeni nobuhlobo bakho ngokwezocansi. Ngithanda ukukukhumbuza ukuthi lolulwazi ozosinika lona luzogcinwa luyimfihlo. Kanti futhi luzosentshenziswa ukuqonda ngezidingo zempilo zabesifazane.** Now I need to ask you some questions about your use of contraceptives and sexual relationships. I would like to remind you that this information will be kept secret and will only be used to better understand women's health needs.			
53	**Ubuneminyaka emingaki ngenkathi uqala ukuya ocansini?** How old were you the first time you had sexual intercourse?	age in years	[ ]	
54	**Wake wasebenzisa indlela yokuhlela umndeni?** Have you ever used any contraceptives?	No 0 Yes 1	[ ]	0→Q68
55	**Iyiphi indlela yokuqala owayisebenzisa?** What was the first method you ever used?	Injectables 1 Pills 2 Condoms 3 IUD / Copper T 4 Other 96 Specify _____	[ ]	
56	**Wayitholaphi leyondlela yokuhlela umndeni?** Where did you get that method?	Clinic 1 Government hospital 2 Y- centre 3 Other public source 4 Private hospital 5 Pharmacy/chemist 6 Private GP 7 Supermarket 8 Spaza shop 9 Other 96 Specify _____	[ ]	
57	**Hlawumbisela ukuthi buneminyaka emingaki ngenkathi uqala ukusebenzisa indlela yokuhlela?** Roughly how old were you when you started using that method?	age in years	[ ]	
58	**Hlawumbisela ukuthi buneminyaka emingaki ngenkathi ugcina ukusebenzisa indlela yokuhlela?** IF NEVER STOPPED, PROBE IF THEY EVER TOOK A BREAK? RECORD THE BREAK Roughly how old were you when you stopped using that method?	Never stopped 95 age in years	[ ]	95→Q67
59	**Bekusiphi isizathu esenza ukuthi uyeke ukusebenzisa lendlela yokuhlela** What was the main reason you stopped using that method?	Wanted to get pregnant 1 Side effects 2 No longer in a sexual relationship 3 Other 96 Specify _____	[ ]	

Other 96
Don't know/ Don't remember 98
Refuse to answer 99

60	**Okwamanje ikhona indlela oyisebenzisayo yokuhlela umndeni?** Are you currently using any contraceptives?	No 0 Yes 1	[ ]	0→Q64
61	**Ingabe iyiphi leyondlela yokuhlela umndeni oyisebenzisayo?** What method are you currently using?	Injectables 1 Pills 2 Condoms 3 IUD / Copper T 4 Other 6 Specify _____	[ ]	
62	**Wayithola kuphi indlela yokuhlela umndeni ngenkathi ugcina?** Where did you get that method the last time you collected it?	Clinic 1 Government hospital 2 Y-centre 3 Other public source 4 Private hospital 5 Pharmacy/chemist 6 Private GP 7 Supermarket 8 Spaza shop 9 Other 96 Specify _____	[ ]	
63	**Hlawumbisela ukuthi ubuneminyaka emingaki ngenkathi uqala ukusebenzisa lendlela yokuhlela?** Roughly how old were you when you started using that method?	age in years	[ ]	
64	**Ingabe ukewasebenzisa enye yezindlela zokuhlela umndeni?** Did you ever use any other types of contraceptives?	No 0 Yes 1	[ ]	0→Q67
65	**Bekuyiziphi? Kukhona ezinye?** MARK ALL What were they? Any others?	Injectables 1 Pills 2 Condoms 3 IUD / Copper T 4 Other 96 Specify _____	a[ ] b[ ] c[ ] d[ ]	
66	**Yiziphi izindawo okewazisebenzisa ekutholeni ezinye izindlela zokuhlela umndeni? Kukhona ezinye?** MARK ALL What places have you used to collect these other methods? Any others?	Clinic 1 Government hospital 2 Y-centre 3 Other public source 4 Private hospital 5 Pharmacy/chemist 6 Private GP 7 Supermarket 8 Spaza shop 9 Other 96 Specify _____	a[ ] b[ ] c[ ] d[ ] e[ ]	

MALE CONDOMS

67	HAS THE RESPONDENT REPORTED HAVING EVER USED CONDOMS? CHECK Q55, Q61, AND Q65	No 0 Yes 1	[ ]	1→Q69
68	**Uke wasebenzisa ijazi lomkhwnenyane nanoma yimuphi umlingani?** Have you ever used a male condom with any partner?	No 0 Yes 1	[ ]	0→Q80
69	**Kumuntu ongcine okuya naye ocansini, ngubani oweza nombono wokuthi nisebenzise ijazi lomkhwenyane: nguwena noma ohlekisana naye?** The most recent person with whom a condom was used, who suggested to use a condom: *you* or *your partner*?	Me 1 My partner 2 Both 3	[ ]	
70	**Uke wathenga noma wamkele ijazi lokhwenyane ngobuwena?** Have you ever collected or bought a condom yourself?	No 0 Yes 1	[ ]	0→Q80
71	**Kwakukunini mhla ugcina ukuzilandela amajazi ngokwakho?** How long ago was the last time you collected a condom yourself?	Days a OR Weeks b OR Months c OR Years d	[ ] [ ] [ ] [ ]	
72	**Esikhathini esendlule, uwathathe kuphi amajazi omkhwenyane?** The last time you collected condoms: Where did you get them?	Clinic 1 Government hospital 2 Y-centre 3 Other public source 4 Private hospital 5 Pharmacy/chemist 6 Private GP 7 Supermarket 8 Spaza shop 9 Other 96 Specify _____	[ ]	

Other 96
Don't know/ Don't remember 98
Refuse to answer 99

73	Yini eyakwenza ukuba uwalande lapho? Why did you collect them from there?	I happened to be there anyway (convenience) 1 It was the closest place (location) 2 It was an anonymous place (privacy) 3 It was cheap or free (Price) 4 I knew I would find them there (reliable supply) 5 Shorter wait 6 Friendlier service 7 Has the type/brand of condom I like 8 Other 96 Specify _____	[ ]	
74	Unikezwe ngubani noma uwatholephi? Ingabe uwathole ebhokisini noma emshinini ofakwa imali? Emuntwini egumbini efihlakele? Eshelufini noma ngenye indlela? How did you collect them? From a box or machine? From a person behind a counter? From a person in a private room, off a shelf, or some other way?	From a box or machine 1 From a person behind the counter 2 From a person in a private room 3 Off a shelf 4 Other 96 Specify _____	[ ]	
75	Kwakunhloboni yamajazi? What brand of condom were they?	Choice 1 Trust 2 Lovers Plus 3 Durex 4 Other 96 Specify _____		
76	Uwakhokhele noma awuwakhokhelanga na? Did you pay for them or were they free?	Free 0 Paid 1	[ ]	0 →Q80
77	Ukhokhe malini ukuthola ibhokisi lamajazi omkhwenyana? How much did you pay for the package of condoms	Don't remember 98	[ ] Rand	
78	Bemangaki ngaphakathi ebhokisini? How many were in that package?		[ ]	
79	a. Ube nayo yini inkinga ngokuthola ijazi lomkhwenyane? Did you have any problems getting the condoms?	No 0 Yes 1	[ ]	

FEMALE CONDOMS

80	Wake wazwela nge-condom yabesimame? Have you ever heard of the female condom?	No 0 Yes 1	[ ]	0→Q94
81	Uke wayibona i-condom yabesimame? Have you ever seen a female condom?	No 0 Yes 1	[ ]	0→Q94
82	Wake wayisebenzisa i-condom yabesimame? Have you ever used a female condom?	No 0 Yes 1	[ ]	1→Q84
83	Kungani? Why not?	Never thought about it 1 Expect discomfort/pain 2 Do not like the way they look 3 I do not need HIV prevention or pregnancy prevention 4 Could not find one 5 Couldn't afford 6 I wanted to but my partner refused 7 Other 96 Specify _____	[ ]	→Q94
84	Ubani oqalile ukuze nisebenzise i-condom yabesimame, nguwena noma umlingani wakho? Who initiated female condom use, you or your partner	Me 1 My partner 2 Both 3	[ ]	
85	Wake wanikwa noma wathenga ama-condom abesifazane ngobuwena? Have you ever collected or bought female condoms yourself?	No 0 Yes 1	[ ]	0→Q94

86	**Ukugcina kwakho ukulanda i-condom yabesimane, wayitholaphi?** The last time you collected a female condom, where did you get it?	Clinic 1 Government hospital 2 Y- centre 3 Other public source 4 Private hospital 5 Pharmacy/chemist 6 Private GP 7 Supermarket 8 Spaza shop 9 Other 96 Specify _____	[ ]	
87	**Yini eyakwenza ukuba uyilande lapho?** Why did you collect it from there?	I happened to be there anyway (convenience) 1 It was the closest place (location) 2 It was an anonymous place (privacy) 3 It was cheap or free (Price) 4 I knew I would find them there (reliable supply) 5 Shorter wait 6 Friendlier service 7 Other 96 Specify_____	[ ]	
88	**Uyilande kanjani? Ingabe uwathole ebhokisini noma emshinini ofakwa imali? Emuntwini egumbini elifihlakele? Eshelufini noma ngenye indlela?** How did you collect them? From a box or machine? From a person behind a counter? From a person in a private room, off a shelf, or some other way?	From a box or machine 1 From a person behind the counter 2 From a person in a private room 3 Off a shelf 4 Other 96 Specify _____	[ ]	
89	**Uwakhokhele noma uphiwe?** Did you pay for them or were they free?	Free 0 Paid 1	[ ]	0→Q94
90	**Ukhokhe malini ukuthola ibhokisi lama-condom abesimame?** How much did you pay for the package of female condoms?	Don't remember 98	[ ] Rand	
91	**Bemangaki ngaphakathi kwebhokisi?** How many were in that package?		[ ]	
92	**Uye wahlangabezana nenkinga ukuwathola lama-condom abesimame?** Did you have any problems getting the female condoms?	No 0 Yes 1	[ ]	0→Q94
93	**Yiziphi izinkinga oyewahlangabezana nazo ekuwatholeni** What problems did you have getting them?	Specify _____ _____		
94	**Manje ngizothanda ukubuza mayelana ngezingane. Ingabe unazo izingane eziphilayo na?** Now I would like to ask you about children. Do you have any children that are alive now?	No 0 Yes 1	[ ]	0→Q96
95	**Zingaki izingane onazo?** **CHECK IF CONSISTENT WITH CONTRACEPTIVE HISTORY, IF NOT PROBE AND CORRECT.** How many children do you have?		[ ]	
96	**Ukhulelwe okwamanje?** Are you currently pregnant?	No 0 Yes 1 Don't know 98	[ ]	1→Q99
97	**Ungathanda ukuba nengane noma izingane ezinyangeni ezingu-12 ezizayo?** Would you like to have any/ more children in the next 12 months?	No 0 Yes 1 Maybe / not sure 3	[ ]	
98	**Uma ungakhulelwa emavikini ambalwa azayo ungajabula noma ungejabule noma ungambaxambili?** If you became pregnant in the next couple of weeks, would you be happy, unhappy, or indifferent?	Happy 1 Unhappy 2 Indifferent 3	[ ]	

Other 96
Don't know/ Don't remember 98
Refuse to answer 99

Determinants of women's demand for barrier methods for HIV prevention

99	**Imibuzo elandelayo imayelana nokokugcina kwakho uya ocansini. Ngokocansi ngichaza ukuthi ohlekisana naye angene ngaphakathi kwesingezansi sakho.** The next questions are about the very last time you had sex. By sex I mean when your partner put his penis in your vagina.			
100	**Isikhathi esingakanani wagcina ngaso ukuya ocansini?** How long ago was the last time you had sex?	Days a OR Weeks b OR Months c	[ ] [ ] [ ]	>6months → ineligible
101	**Ungabuchaza kanjani ubuhlobo onabo nomuntu wokugcina owaya ocansini naye?** Can you describe your relationship with the last person you had sex with?	Husband 1 Regular partner 2 Casual acquaintance 3 One-off/ someone I just met 4 Client/ paying partner 5 Other 96 Specify _____	[ ]	
102	**Uhlala naye lowomuntu?** Do you live with this person?	No 0 Yes 1	[ ]	
103	**Abesimame abaningi bahlangabezana nobunzima ekutheni abalingani babo basebenizise amajazi. Sekuke kwakwe nzakalela wena lokho na?** Many women find it difficult to get their partners to use condoms. Has this ever happened to you?	No 0 Yes 1	[ ]	
104	**Ukugcina kwakho ukuya ocansini, ulisebenzisile ijazi lomkhwenyane?** The last time you had sex, was a condom used?	No 0 Yes 1	[ ]	0→Q106
105	**Isiphi isizathu esasibalulekile esenze usebenzise ijazi lomkhwenyane?** What was the main reason a condom was used?	HIV prevention 1 Pregnancy prevention 2 STI prevention 3 Dual protection 4 Other 96 Specify _____	[ ]	→Q107
106	**Isiphi isizathu esibalulekile esikwenze ukuba ungasebenzisi ijazi lomkhwenyane?** IF ANSER IS 'PARTNER REFUSED, AND Q103 IS 'NO' PROBE INTO WHICH IS CORRECT. What was the main reason a condom was not used?	I want to get pregnant 1 I am not worried about HIV or STI 2 I do not like condoms 3 I wanted to but my partner refused 4 We did not have one at the time 5 I never suggested because I was afraid 6 Other 96 Specify _____	[ ]	
107	**Nogizokufundela ezinye zezitatimende ezimayelana nokuzivikela kusandulela ngculaza. Kusitatimende ngasinye ngicela usho ukuthi ucabanya ukuthi kuyiqinso noma akulona.** **Abantu bangazivikela ekutholeni isandulela ngculazi, ...** I am going to read out some statements about protection against HIV. For each statement please tell me whether you think it is true or not. People can protect themselves from becoming infected with HIV by.....			
	a. Ngokudla ukudla okulungele umzimba. Having a good diet	No 0 Yes 1 Don't know 98	a[ ]	
	b. Ngokuba nomlingani oyedwa othembekile. Staying with one faithful partner	No 0 Yes 1 Don't know 98	b[ ]	
	c. Ngokugwema izindlu zangasese zomphakathi. Avoiding public toilets	No 0 Yes 1 Don't know 98	c[ ]	
	d. Ngokusebenzisa ijazi uma uya ocansini. Using condoms during sexual intercourse	No 0 Yes 1 Don't know 98	d[ ]	
	e. Ngokugwema ukuthintana nomuntu onesifo sesandulela ngculazi. Avoiding touching a person who has HIV/AIDS	No 0 Yes 1 Don't know 98	e[ ]	
	f. Ngokugwema ukudla nomuntu onesifo sesandulela ngculazi. Avoiding sharing food with a person who has HIV/AIDS	No 0 Yes 1 Don't know 98	f[ ]	
	g. Ngokugwema ukulunya umndozolwane noma izilwanyana ezifana nazo. Avoiding being bitten by mosquitoes or similar insects	No 0 Yes 1 Don't know 98	g[ ]	
	h. Ngo kuqinisekisa ukuba umjovo osetshenziswayo uhlanzekile. Making sure any injection they have is done with a clean needle	No 0 Yes 1 Don't know 98	h[ ]	

108	**Uzibona usencuphekeni enkulu, noma elingene, noma encane, noma lingekho kwasantlobo ithuba lokuba ne -HIV noma usuleleke futhi ngegciwane?** Do you consider yourself at high, medium, low, no risk of getting HIV or becoming re-infected?	High risk 1 Low risk 3 Medium risk 2 No risk 4	[ ]

SECTION 3: STATED PREFERENCES & INTRODUCTION TO FEMALE BARRIER METHODS

Sizoxoxa ngezindlela ezahlukahlukile esinazo zokuvikelwa kwe-HIV okungamajazi omkhwenyane kanye nalawo asetshenziswa ngabesimame kanye nezinye ezisacutshungulwa noma ezisenziwa okungama-microbicides kanye nama-diaphragm. Ngiyethemba ukuthi unolwazi ngejazi lomkhwenyane lobaba. Asebenza kakhulu ekuvikeleni isanduleli ngculazi nokukhulelewa. Afakwa nje ngaphambi kokuya ocansini futhi angeke asetshenziswa owesilisa angazi futhi azibandakanye. Manje sizonitshela kabanzi ngezinye zezindlela ezikhona.

Okokuqala nge-condom yabesimame. HAND TO PARTICIPANT. I-condom yabesimame ikhona kanti futhi isiyatholakala emitholampilo kanye nasezitolo. Ikunika ukuvikeleka okuthembekile kwizifo ezifana no-HIV, STI kanye nasekukhulelweni. Ingafakwa isikhathi esingaba amahola ayisithupha (6 hours) ngaphamb' kokuya ocansini, kanti futhi ingagcineka amahola ayisithupha (6 hours). Kuyangxuswa ukuthi usebenzise i-condom yabesimame entsha njalo uma uya ocansini ngezigaba, kodwa i-condom yabesimame iqinile kanti futhi ngesinye isikhathi ingabuye isetshenziswe futhi uma ngabe entsha ingekho ngalesosikhathi, lingekho nalo ijazi lomkhwenyane noma ohlekisana naye engathandi ukusebenzisa ijazi lomkhwenyane.Uma ngabe i-condom yabesimame ibuya isetshenziswa futhi, kudingeka ukuba igezwe ngobunono ngensipho namanzi bese ingasetshenziswa izihlandla iziyisikhombisa noyedwa olala naye. Kwesinye isikhathi lomlomo uyaye ungene ngaphakathi kowesimame, kanti abanye bathi bayaye bezwe i-condom yabesimame ihamba uma beya ocansini. Ikhondomu yabesimame ingasetshenziswa kanye nemijovo yokuvikela noma amapeni wokugoma.

I-Diaphragm, HAND TO PARTICIPANT, indlela beyisetshenziswa kudala ukuvikela ukukhulelwa kwabesimame kanti futhi isikuvezile ukuthi iyakwazi ukuvikela i-STI. Isacutshungulwa ukubona ukuthi ingakwazi ukuvikela ukususeleka kwe-HIV. I-diaphragm ingagcineka ngaphakathi kwesingezansi sowesimame amahora angu-24 (24 hours) ngesinye isikhathi, okusho ukuthi ingafakwa noma ngasiphi isikhathi ngaphib' kokuya ocansini. Kufanele ingcinwe amahola ayisithupha (6 hours) emva kokuya ocansini. I-diaphragm oyibonayo lapha idinga ukuba ifakwe abasenzi bezempilo (health worker) ukuze ibe ngelingene ngokwanele kanti futhi ingasetshenziswa ukuya eminyakeni emibili (2 years) uma inakekelwe ngokwanele. Loku kusho ukunakekela uma ikhishwa ingagqobhozwa ngezinzipho ezide, igezwe ngamanzi nensipho bese igcinwe ebhokisini layo. Ukusebenzisa i-lubricant kwenza kube ukuyifaka. Uma i-lubricant ingekho ukumanzisa i-diaphragm ngamanzi kancane kunganceda ukuthi ishelele ingene kalula kwisitho sangasese. Abanye besilisa bangayizwa i-diaphrgm ngenkathi aya ocansini kanti abanye bengayizwa. Noma kunjalo uketshezi luyadingeka njalo uma izosetshenziswa. Ocwepheshe basungula i-diaphragm engasetshenziswa kanye ilahlwe futhi ezobanobukhulu obubodwa, bulingane wonke owosimame. I-diaphragm ingasetshenziswa kanye nemijovo yokuvikela noma namapeni okugoma noma namacondom.

109

Ama Microbicide, BONISA ISISETSHENZISWA kobuzwayo, yizisetshewziswa ezisahlolisiswa ukuze kubonwe ukuthi ingabe zinganciphisa incupheko yabesimame ekusulelekeni ngesanduleli ngculaza. Kunemihlobo ehlukahlukene yamaMicrobicide ehlolisiswayo, eminye inganciphisa amathuba wabesimame okukhlelwa, eminye ingenciphise. Namuhla sizokhuluma ngamafutha we-microbicide. Wona angeza agcwaliswe kwisisetshenziswa, okuzodingakalaka ukuba silahlwe emuva kokuba sisetshenziswe kanye, noma angeza njengesisetshenziswa esingasetshenziswa kaningi kanye nesiphatho samafutha we-Microbicide. Lesi sisetshenziswa sidinga ukuwashwa emva kokuba sisetshenziswe, sigcwaliswe ngaphambi kokuba sisetshenziswe futhi. Ezinye izinhlobo zizodinga ukufakwa nje njaphampi kokuya ocansine, eminye ifakwe kusele i-awa elilodwa lokuya ocansini, ezinye zingavikela ukuya kuma-awa angamashumi amabili nane (24) emva kokufakwa. Amafutha angenza owesimame athande ukubamanzi kancane ngaphansi. Abanye abalingani bangakunaka lokhu kanti abanye bangeke. I-Microbicide ingasetshenziswa kanyekanye nemijovo yokuhlela, amapililisi okuhlela kanye namakhondomu.

Ngizothanda ukukukhumbuza ukuthi, okwamanje asazi ukuba i-diaphragm nama-microbicide ayanika uvikeleko lesanduleli ngculaza. Ama-condomu wabesilisa nabesimame aseke abonisa uvikeleko lwesandelelo ngculaza.

We are going to discuss existing barrier methods for HIV prevention: male condoms, female condoms and some that are being developed: microbicides and the diaphragm. I am sure you are all familiar with male condoms. They are very effective in preventing HIV infection and pregnancy. They are put on right before sexual intercourse, and cannot be used without a male partners knowledge and participation. We will now tell you a bit more about the other products.

Firstly the female condom: HAND TO PARTICIPANT. The female condom is available in some clinics and shops. It provides good protection against HIV, STI and pregnancy. It can be put in for up to 6 hours before sex, and can be kept in for a total of 6 hours. It is recommended that a new female condom is used for each round of sex, however the female condom is strong and can in some cases be reused if no new one is available, and there is no male condom or your partner does not wish to use a male condom. If the female condom is re-used, it needs to be washed carefully with soap and water and patted dry between each use. It should not be used more than 7 times. The outer ring can sometimes slip inside the vagina, and some people say they can hear the female condom move while they have sex. The female condom can be used at the same time as using injectable contraceptives or the pil.

The Diaphragm, HAND TO PARTICIPANT, is a method that has long been used for pregnancy prevention and has shown to prevent some STIs. It is currently being tested to see if it provides any protection against HIV infection. The diaphragm can be kept in the vagina for up to 24 hours at a time, so can be inserted anytime before sex. It must be left in place for at least 6 hours after sex. The diaphragm you see here needs to be fitted by a health worker for the correct size and can be used for up to 2 years if cared for properly. This means that care is taken when removing it, not to pierce it with a long finger nail, and to wash it with soap and water and store it in its box. Using a lubricant makes the diapragm easier to insert. If lubricant is not available, wetting the diaphragm with a little water can help slide the diaphragm into the vagina. Some partners can feel the diapragm during sex, while others cannot feel it. Scientists are developing a single-use disposable diaphragm and a one-size fits all diaphragm. The diaphragm can be used at the same time as using injectable contraceptives, the pil, and/or condoms. .

Microbicides, HAND APPLICATOR TO PARTICIPANT, are new products that are being tested to see if they can reduce women's risk of becoming HIV positive. Microbicides are also being tested to see if they can prevent some STI. These products are still being tested, it is not yet known if they provide any protection against HIV or whether they may reduce a woman's chance of becoming pregnant. If an effective microbicide is found, they may either come in a pre-filled applicator that will need to be thrown away after each use, or may be developed for use with a re-usable applicator with a tube of microbicide. The re-usable applicator will need to be washed after each use and refilled before each use. It is also not known if they need to be inserted directly before sex or if it can be inserted a few hours in advance. The gel may make the vagina a little bit more moist (wet). Some partners may notice this, while others may not. Microbicides can be used at the same time as using injectable contraceptives, the pill, and/or condoms.

We would like to remind you that right now we do not know if the diaphragm and microbicides provide any protection against HIV. Only male and female condoms have been shown to prevent HIV infection.

WILLINGNESS TO PAY

110 **Ngizothanda ukwazi ukuthi ingabe uzithandile lezindlela lezi esesikhulume ngazo. Sicela ucabange zonke izinkinga zakho eziphathelene nemali kanye nomuntu oya naye ocansini okwamanje. Unazo ezinye izindlela zokuthola ama-condom wabesilisa ungakhokhile noma kumele uwakhokhele. Khumbula azikho izimpendulo eziqondile, sifuna ukwazi umbono wakho.**

Now I would like to ask you about your general interest in these new methods we have just discussed. Please think of your own financial situation at the moment and your most recent sexual partner when you answer the questions. You still have the existing other options of collecting male condoms for free or paying for them. Remember there are no right answers, we are interested in your opinions.

111	**Ungafisa ukuzama i diaphragm le ezoyehlisa izinga lokuthola i hiv ngesigamu.** **Loku kusho ukuthi kubantu besifazane abangamashumi amabili (20) bangaba (HIV) bengasebenzisi izindlela zokuzivikela, abayishumi(10) babo bangaba neleligciwane (HIV) mangabe besebenzisa i diaphragm ngaso sonke isikhathi uma beya ocansini.** Would you be interested and able to try a Diaphragm that would reduce your risk of getting HIV by half? This means that if 20 women would become HIV-positive if they used no barrier method, about 10 would be come HIV positive if all women used a diaphragm each time they had sex.	**No 0 Yes 1**	[ ]	0→Q114
112	**I diaphragm ubona kuyindlela ofuna ukuyisebenzisa noma uhlale uyisebenzisa kulesimo okuso.** Is the diaphragm something you think you would want to use and be able to use regularly in your current situation?	**No 0 Yes 1**	[ ]	
113	**Ukube i diaphragm le okhona ukuyisebenzisa izikhathi eziningi (re-usable) umabeyikhona futhi ufuna ukuyithenga kuleviki, ungazimisela ukuyithenga ngemalini.** If the reusable diaphragm was available and you wanted to buy it this week, what is the highest price it could be for you to still want to buy it and still be able to buy it?		[ ] Rand	
114	**Ungakuthokozela ukuzama i microbicid le eyehlisa amazinga okuthola I (HIV) ngesigamu(half)?** **Loku kusho ukuthi kubesifazane abangu (20) bangaba (HIV) benga sebenzisanga izivikelo, abangu (10) babe (HIV) mangabe bonke besebenzisa i microbicid sonke isikhathi mabeya ocansini.** Would you be interested and able to try a Microbicide that reduces your risk of getting HIV by half? This means that if 20 women would become HIV-positive if they did not use a barrier method, about 10 would be come HIV-positive if all women used microbicides each time they had sex.	**No 0 Yes 1**	[ ]	0→Q117
115	**Ubona ukuthi i microbicid yiyo indlela ofuna ukuyisebenzisa ngaso sonke isikhathi?** Are microbicides something you think you would want to use and would be able to use regularly?	**No 0 Yes 1**	[ ]	
116	**Mangabe le microbicide oyisebenzisa kanye beyitholakala ufuna ukuyithenga kuleviki, kade uzimisele ukuthenga ngemalini?** If this single-use microbicide was available, what is the highest price it could be for you to still want to buy it and still be able to buy it this week?		[ ] Rand	

Other 96
Don't know/ Don't remember 98
Refuse to answer 99

117	**Ubungathanda yini ukuzama i-condom yabesimame eyehlisa incupheko yokusuleleka ngesandulela ngculazi ngo 95% (phesenti)** **Okusho ukuthi abesifazane abangu 20 baba (HIV) bengasebenzisanga le ndlela, oyedwa eba (HIV) mangabe bonke besebenzise i condom ngaso sonke isikhathi mabeya ocansini.** Would you be interested and able to try a Female Condom that reduces your risk of getting HIV by 95%? This means that if 20 women would become HIV-positive if they did not use a barrier method, about 1 would be come HIV-positive if all women used a female condom each time they had sex.	**No 0**	**Yes 1**	**[ ]**	0→Q120
118	**Ngabe i condom yabesifazane yiyo ofuna ukuyisebenzisa ngasosonke isikhathi?** Is the female condom something you would want to use and be able to use regularly?	**No 0**	**Yes 1**	**[ ]**	
119	**Mangabe ubufuna ukuyithenga kuleliviki, ubungayithenga ngamalini ongakhona ukuyithenga ngayo futhi?** This week, what is the highest price a female condom could be for you to still want to buy it and still be able to buy it?			**[ ] Rand**	
120	INTRODUCTION TO ATTRIBUTES AND LEVELS **Sihlangene la namhlanje sifuna ukuthola indlela esingenza ngayo ukuthi lezindlela zokuvikela zitholakale kwabesimame. Sifuna ukwazi yini ekwenza ufune ukuzisebenzisa, yini into eyenza kube lula noma kube nzima ukuzisebenzisa nomuntu ozwana naye? Sizobheka ukusebenza kwazo, indlela yokuthi ukhone ukuzithola, nokwazisa abantu ngazo. Sizothanda ukuthi ucabange ngezinto ezisetshenziswayo ukuvikela i (HIV) nangokuhlukana kwazo.** We are here today to understand the best way to introduce these new products to women. We want to know how you decide to use a product, which things make it easier or more difficult to use them with your most recent partner. We will be looking at characteristics of the product, ways to make them accessible to you, and ways to advertise and promote them. First we would like you to start thinking about these HIV prevention products and their differences.				
121	**Eziphi phakathi kwalezi ocabanga ukuthi ungakhona ukuzisebenzisa kahle njalo. Ngicela ucabange ngokuhlela kwakho umdeni?** **DISPLAY IMAGE 1** Which of these products do you think would suit your reproductive health needs best. Please think about which of these products you would be most likely to use regularly. Male condom 1 · Female condom 2 · Diaphragm 3 · Microbicide 4				Mark answer in Q141
122	**Iyiphi indlela yokuvikela ukukhulelwa oyifunayo kulezinto zokuvikela i (HIV)?** **Ezinye (POINT TO 1), Ayikho (POINT TO 2), Kakhulu kakhulu (POINT TO 3), Kakhulu (POINT TO 4),** **Umangabe sivimbela isisu ngo 55%, abangu 9 bangakhulelwa.** **Umangabe usisetshenziswa asivimbeli isisu kwasantlobo, abesimame abangu 20 bangakhulelwa.** **Umangabe sivimbela isisu ngo 95%, abangu 1 bangakhulelwa.** **Umangabe sivimbela isisu ngo 75%, abangu 5 bangakhulelwa.** **DISPLAY IMAGE 2** What kind of pregnancy prevention do you want from your HIV prevention product? None (POINT TO 1), Some (POINT TO 2), High (POINT TO 3), Very high (POINT TO 4). If the product does not prevent pregnancy at all, 20 women would get pregnant. If it prevents pregnancy by 55% then 9 women would get pregnant. If it prevents pregnancy by 75% 5 women would get pregnant. If it prevents pregnancy by 95%, 1 woman would get pregnant. 55% 1 · None (0%) 2 · 95% 3 · 75% 4				

Other 96
Don't know/ Don't remember 98
Refuse to answer 99

123	Ingabe kubalulekile ukusebenzisa lezindlela zokuzivikela ngasese. Lokhu kusho ukuthi ngaphandle kokuthi umlingani wakho azi? **DISPLAY IMAGE 3** Is it important to be able to use a product in secrecy? That means without your partner knowing? Yes: 1 — No: 2	
124	Ufuna le evikela kancane (POINT TO 1) noma le ekuvikela ku HIV, noma yezinga eliphakeme kakhulu (POINT TO 2), noma ngokulingene (POINT TO 3), noma yezinga eliphakeme (POINT TO 4) ukuvikela i HIV? **DISPLAY IMAGE 4** Umangabe akusetshenziswa isivikelo sesandulela ngculaza abesimame abangu 20 bebangasuleleka. Umangabe bonke besimame basebenzise isivikelu sesandulela ngculaza esinciphisa incupheko 35%, 13 wabesimame bangasuleleka abangu 7banga sinda. Umangabe bonke besimame basebenzise isivikelu sesandulela ngculaza esinciphisa incupheko 95%, 1 wabesimame bangasuleleka abangu 19 banga sinda. Umangabe bonke besimame basebenzise isivikelu sesandulela ngculaza esinciphisa incupheko 55%, 9 wabesimame bangasuleleka abangu 11 banga sinda. Umangabe bonke besimame basebenzise isivikelu sesandulela ngculaza esinciphisa incupheko 75%, 5 wabesimame bangasuleleka abangu 15 banga sinda. Do you need a product that provides low (POINT TO 1) protection against HIV, very high (POINT TO 2) protection, medium protection (POINT TO 3), or high protection (POINT TO 4) against HIV? If no HIV protection is used 20 women would become infected. If all women used a product that reduced the risk of HIV infection by 35%, 13 women would become HIV infected and 7 would remain HIV negative. If all women used a product that reduced the risk of HIV infection by 55%, 9 women would become HIV infected and 11 would remain HIV negative. If all women used a product that reduced the risk of HIV infection by 75%, 5 women would become HIV infected and 15 would remain HIV negative. If all women used a product that reduced the risk of HIV infection by 95%, 1 woman would become HIV infected and 19 would remain HIV negative. 35%: 1 — 95%: 2 — 55%: 3 — 75%: 4	
125	Uzimisele ukukhipha noma ungakwanzi ukukhipha malini ngalezi **ozisebenzisa kanye** ngaso sonke isikhathi mawuya ocansini? [KHOMBA IMALI USAKHULUMA]. Kungaba 0 Rand Bengingakhona ukuzisebenzisa umazingakhokhelwa?bengingazisebenzisa ngaso isikhathi umangiya ocansini umaziza 5 Rand, 10 Rand noma 20 Rand.Unazo ezinye izindlela zokuthola ama-condom wabesilisa ungakhokhile noma kumele uwakhokhele. **DISPLAY IMAGE 5** What is the highest amount you would be willing to pay and could afford to pay for any of these single use products to use it every time you have sex? [POINT TO AMOUNTS AS YOU SAY:] Is it 0 Rand, I would only use it if it were free? Or I would use it every time I had sex if it were 5 Rand, 10 Rand, or 20 Rand. You still have the existing other options of collecting male condoms for free or paying for them. 0 Rand, I would only use them if they were free: 1 — 5 Rand: 2 — 10 Rand: 3 — 20 Rand: 4	1→Q129

Determinants of women's demand for barrier methods for HIV prevention

126	GET RESPONSE Q100: HOW LONG AGO WAS LAST SEX ACT? • IF 7 DAYS OR LESS → SPEAK OF '*LAST WEEK*' • IF BETWEEN 8 DAYS AND 1 MONTH AGO→ SPEAK OF '*LAST MONTH*' • IF MORE THAN 1 MONTH AGO → SKIP TO Q129	Days a Weeks b Months c	[ ] [ ] [ ]	skips
	Uke washo ngaphambilini ukuthi ungakhona ukukhokha imali engadluli ku _____Rand [FROM Q125] ukusebenzisa enye yalezindlela zinkathi zonke uya ocansini. Manje masibale.ukuthi lokho kungasho ukuthi yimalini ngeviki noma ngenyanga. Lelithebula libonisa ukuthi yimalini ongayisebenzisa ezintweni ezivimbela iHIV kuya ngenani oye ngalo ocansini. Ungakhumbula ukuthi uyekangakhi ocansini emavikini/ezinyangeni ezedlule. [SEE Q126]. Ngicela ukhombe inani lemali obungabe uyisebenzisile kwizindlela zokuvimbela kwizinto ezivinbela iHIV kwiviki noma inyanga edlule, uma usebenzisa izindlela zokuvimbela nkathi zonke uya ocansini.			
d.	Uma ubuye ocansini kayishumi evikini noma enyangeni edlule, ubuzodinga ukuchitha imali _____; Uma ubuye ocansini kayisishiyagalolunye ubuzondinga ukuchitha imali e_____...[ETC, UNTIL SHE INDICATES THE CORRECT AMOUNT		[ ] Rand	
	DISPLAY IMAGE 5A You just said you would be able to pay a maximum of _____[FROM Q125] Rand to use one of these products each time you have sex. Let's calculate what that would mean per week or month. This table shows how much you would be spending on HIV prevention products depending on the number of times you had sex. Can you remember the number of times you had sex in the last Week/Month? [see 126] . Please point to the amount you would have spent on barrier methods for HIV prevention products in the past week/month, if you use a barrier method each time you had sex. [YOU MAY NEED TO ASSIST, START WITH 10 ROUNDS AND WORK DOWN TOWARDS 1] If you had 10 rounds of sex in the last week/month, you would have needed to spend ____ [50 Rand/ 100 Rand/ 200 Rand]; If you had 9 rounds, you would have needed to spend ....., ETC, ETC...			
127	Yiyo imali ongakhona ukuyi khokhela? Is that an amount you can afford?	No 0 Yes 1	[ ]	1→Q129

128	Ungakwazi ukukhokha imali engakani kulezinto ongazisebenzisa kanye			
	DISPLAY IMAGE 5B What is the highest amount you could afford for any of these Single use products?			
	0 Rand, Bengingakhona ukuzisebenzisa umazingakhokhelwa I would only use them if they were free	5 Rand	10 Rand	20 Rand
	1	2	3	4

129	Ungakwazi ukukhokha imali engakanani kulezinto ongaphinda uzisebenzise njalo?			
	DISPLAY IMAGE 6 What is the highest amount you would be willing and able to pay for any of these Reusable use products?			
	0 Rand, Bengingakhona ukuzisebenzisa umazingakhokhelwa I would only use them if they were free	20 Rand	40 Rand	80 Rand
	1	2	3	4

Usitholile isikhathi sokuthi ucabange ngezinto ongazisebenzisa ukuzivikela mayelana nempilo yakho:
Imibuzo elandelayo sizobuza ngezinto ezahlukene ongacabanga ukuthi ungakhona ukuzisebenzisa futhi ongazikhetha ukuzisebenzisa ekuvikeleni i (HIV). Okokuqala uzonikwa ukuthi ukhethe indlela kanye noku sebenza kwayo ekuvikeleni i (HIV). Sithanda ukuthi ubhekisise kulezindlela ezimbili ubheke ukuthi kungaba khona ongayi khetha noma ayikho. Kubalulekile ukuthi ucabange ngesimo okuso futhi ubheke ukuthi eyiphi indlela ongayisebenzisa ezobancono kuwe. Sifuna ukwazi ukuthi ukhetha kanjani cabanga ukuthi iyiphi indlela encono kule simo okuso. Ukugcina kwakho ukuya ocansini indlela owayisebenzisa ucabanga ukuthi
130 ungashinthsa ukhethe kelezi esesikhulume ngazo. Bowuzobe ukhethe i MICROBICIDE, i condom yabisimame noma ungashintshi lutho? Akukho zimpendulo ezicondile noma ezingacondanga, sidinga ukwazi okungasebenza ngcono kwabesimame.

Now you have had a chance to think about differences between the product benefits and prices. we will move on to the final set of questions that ask about whether or not you might have been able to use these different products if they were all available now. Please look at the two options and think back to the last time you had sex. Would you do the same thing you did last time you had sex, or would you have used one of the two options provided? Please tell is which option you would have done: Option A, Option B, or Neither. Neither means 'do what you did in your last sex act (use a condom or not)'. It is important to think about your own situation and consider which of the three options you are most likely to have used. Please remember, there are no right or wrong answers;. we are only interested in learning what may work best for women like yourself in the future.

131 Ukugcina kwakho ukuya ocansini indlela owayisebenzisa ucabanga ukuthi ungashinthsa ukhethe kulezi esesikhulume ngazo? . Bowuzobe ukhethe i microbicide, i condom yabisimame noma bewungeshintshe lutho. Lokhu kusho ukuthi bewuzosebenzisa i-condom noma bewungesebesizise lutho ukuvimbela isandulela ngculaza.[BHEKA Q104]

DISPLAY IMAGE 7

Imagine you had had the choices below the last time you had sex, would have changed from what you actually did last time you had sex? Would you have chosen Choice A (use a microbicide), Choice B (use a Female condom) or Choice C, no change from what actually happened. This means you would: use a condom / not use any barrier method for HIV prevention [SEE Q104]

WARM UP QUESTION	Choice A	Choice B	Choice C: Do what I did last time I had sex.
CHOICE	1	2	3

132 Manje ngizocela ukuba ukhethe phakathi kwezinhlobo zokuvikela ezinezinzuzo ezahlukene futhi ezibiza ngokwahlukahlukene. Akulula ukukhtha, kodwa kubonisa izindlela ezahlukene abesifazane abangahlanyabezana nazo ekukhetheni izinhlobo ezintsha zokuvikela ezingaba khona. (Abanga ngenkathi ugcina ukuya ocansini ngazo zonke izinkathi kwnzaka ngicela ugitshaele iyiphi indlela obungayikhetha. Ngicela ungitshele uma ufuna ngikuchazele kabanzi.

I am now going to ask you to make choices between products with different benefits and prices. They are not easy choices, but represent the range of choices women may face if these new products become available. Thinking about the very last time you had sex, in each case please tell me which choice you would have made. Please let me know if you need me to explain anything further to help you choose.

133 Nazi izinhlobo zokuvikela, futhi zisebenza lokhu: ubungathanda ukusebenzisa enya yalezizinhlobo ngenkathi ugcina ukuya ocansini noma ubungenza ngendlela obuwnze ngayo ekuqaleni?

Indlela yokuqala yi [PRODUCT A] (engasetshenziswa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY A YES/NO] ngasese umlingani wakho engazi, yehlisa amathuba akho wokukhulelwa [PREGNANCY PREVENTION A] %, futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION A] %, yona ibiza [PRICE A] randi. Noma bowungathanda ukusebenzisa indlela yesibili, [PRODUCT B] (ongayisebenzisa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY B YES/NO] ngasese umlingani wakho engazi, ukwazi ukuyisebenzisa ngasese umlingani wakho engazi, yehlisa amathuba akho woku khulelewa ngamaphesenti [PREGNANCY PREVENTION B] %. Futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION B] %, yona ibiza [PRICE B] randi. Ubungasebenzisa enye yalezizindlela ngenkathi ugcina ukuya ocansini noma ubungeke usebenzise intlobo yokuzivikela/ ikhondomu njengoba uye wenza ngenkathi ugcina ukuya ocansini?

DISPLAY IMAGE 8

Here are the products and this is what they do: Would you have used either of these products in your last sex act or would you have still done the same as you did the last time you had sex? Option A is a [PRODUCT A] that can [IF SECRECY A IS YES] cannot [IF SECRECY A NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION A] %, and reduces your risk of HIV by [HIV PREVENTION A], and will cost you [PRICE A], or would you have used Option B. This is a [PRODUCT B] that can [IF SECRECY B IS YES] cannot [IF SECRECY B NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION B] %, and reduces your risk of HIV by [HIV PREVENTION B], and will cost you [PRICE B]? Would you have used either of these the last time you had sex or would you have used a condom / not used a barrier method like you did last time you had sex?

Choice Attribute	A	B	C: Neither
CHOICE	1	2	3

Nazi izinhlobo zokuvikela, futhi zisebenza lokhu: ubungathanda ukusebenzisa enya yalezizinhlobo ngenkathi ugcina ukuya ocansini noma ubungenza ngendlela obuwnze ngayo ekuqaleni?

Indlela yokuqala yi [PRODUCT A] (engasetshenziswa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY A YES/NO] ngasese umlingani wakho engazi, yehlisa amathuba akho wokukhulelwa [PREGNANCY PREVENTION A] %, futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION A] %, yona ibiza [PRICE A] randi. Noma bowungathanda ukusebenzisa indlela yesibili, [PRODUCT B] (ongayisebenzisa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY B YES/NO] ngasese umlingani wakho engazi, ukwazi ukuyisebenzisa ngasese umlingani wakho engazi, yehlisa amathuba akho woku khulelewa ngamaphesenti [PREGNANCY PREVENTION B] %. Futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION B] %, yona ibiza [PRICE B] randi. Ubungasebenzisa enye yalezizindlela ngenkathi ugcina ukuya ocansini noma ubungeke usebenzise intlobo yokuzivikela/ ikhondomu njengoba uye wenza ngenkathi ugcina ukuya ocansini?

134

DISPLAY IMAGE 9

Here are the products and this is what they do: Would you have used either of these products in your last sex act or would you have still done the same as you did the last time you had sex? Option A is a [PRODUCT A] that can [IF SECRECY A IS YES] cannot [IF SECRECY A NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION A] %, and reduces your risk of HIV by [HIV PREVENTION A], and will cost you [PRICE A], or would you have used Option B. This is a [PRODUCT B] that can [IF SECRECY B IS YES] cannot [IF SECRECY B NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION B] %, and reduces your risk of HIV by [HIV PREVENTION B], and will cost you [PRICE B]? Would you have used either of these the last time you had sex or would you have used a condom / not used a barrier method like you did last time you had sex?

Choice / Attribute	A	B	C: Neither
CHOICE	1	2	3

Nazi izinhlobo zokuvikela, futhi zisebenza lokhu: ubungathanda ukusebenzisa enya yalezizinhlobo ngenkathi ugcina ukuya ocansini noma ubungenza ngendlela obuwnze ngayo ekuqaleni?

Indlela yokuqala yi [PRODUCT A] (engasetshenziswa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY A YES/NO] ngasese umlingani wakho engazi, yehlisa amathuba akho wokukhulelwa [PREGNANCY PREVENTION A] %, futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION A] %, yona ibiza [PRICE A] randi. Noma bowungathanda ukusebenzisa indlela yesibili, [PRODUCT B] (ongayisebenzisa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY B YES/NO] ngasese umlingani wakho engazi, ukwazi ukuyisebenzisa ngasese umlingani wakho engazi, yehlisa amathuba akho woku khulelewa ngamaphesenti [PREGNANCY PREVENTION B] %. Futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION B] %, yona ibiza [PRICE B] randi. Ubungasebenzisa enye yalezizindlela ngenkathi ugcina ukuya ocansini noma ubungeke usebenzise intlobo yokuzivikela/ ikhondomu njengoba uye wenza ngenkathi ugcina ukuya ocansini?

135

DISPLAY IMAGE 10

Here are the products and this is what they do: Would you have used either of these products in your last sex act or would you have still done the same as you did the last time you had sex? Option A is a [PRODUCT A] that can [IF SECRECY A IS YES] cannot [IF SECRECY A NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION A] %, and reduces your risk of HIV by [HIV PREVENTION A], and will cost you [PRICE A], or would you have used Option B. This is a [PRODUCT B] that can [IF SECRECY B IS YES] cannot [IF SECRECY B NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION B] %, and reduces your risk of HIV by [HIV PREVENTION B], and will cost you [PRICE B]? Would you have used either of these the last time you had sex or would you have used a condom / not used a barrier method like you did last time you had sex?

Choice / Attribute	A	B	C: Neither
CHOICE	1	2	3

136 Nazi izinhlobo zokuvikela, futhi zisebenza lokhu: ubungathanda ukusebenzisa enya yalezizinhlobo ngenkathi ugcina ukuya ocansini noma ubungenza ngendlela obuwnze ngayo ekuqaleni?

Indlela yokuqala yi [PRODUCT A] (engasetshenziswa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY A YES/NO] ngasese umlingani wakho engazi, yehlisa amathuba akho wokukhulelwa [PREGNANCY PREVENTION A] %, futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION A] %, yona ibiza [PRICE A] randi. Noma bowungathanda ukusebenzisa indlela yesibili, [PRODUCT B] (ongayisebenzisa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY B YES/NO] ngasese umlingani wakho engazi, ukwazi ukuyisebenzisa ngasese umlingani wakho engazi, yehlisa amathuba akho woku khulelewa ngamaphesenti [PREGNANCY PREVENTION B] %. Futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION B] %, yona ibiza [PRICE B] randi. Ubungasebenzisa enye yalezizindlela ngenkathi ugcina ukuya ocansini noma ubungeke usebenzise intlobo yokuzivikela/ ikhondomu njengoba uye wenza ngenkathi ugcina ukuya ocansini?

DISPLAY IMAGE 11

Here are the products and this is what they do: Would you have used either of these products in your last sex act or would you have still done the same as you did the last time you had sex? Option A is a [PRODUCT A] that can [IF SECRECY A IS YES] cannot [IF SECRECY A NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION A] %, and reduces your risk of HIV by [HIV PREVENTION A], and will cost you [PRICE A], or would you have used Option B. This is a [PRODUCT B] that can [IF SECRECY B IS YES] cannot [IF SECRECY B NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION B] %, and reduces your risk of HIV by [HIV PREVENTION B], and will cost you [PRICE B]? Would you have used either of these the last time you had sex or would you have used a condom / not used a barrier method like you did last time you had sex?

Choice / Attribute	A	B	C: Neither
CHOICE	1	2	3

137 Nazi izinhlobo zokuvikela, futhi zisebenza lokhu: ubungathanda ukusebenzisa enya yalezizinhlobo ngenkathi ugcina ukuya ocansini noma ubungenza ngendlela obuwnze ngayo ekuqaleni?

Indlela yokuqala yi [PRODUCT A] (engasetshenziswa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY A YES/NO] ngasese umlingani wakho engazi, yehlisa amathuba akho wokukhulelwa [PREGNANCY PREVENTION A] %, futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION A] %, yona ibiza [PRICE A] randi. Noma bowungathanda ukusebenzisa indlela yesibili, [PRODUCT B] (ongayisebenzisa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY B YES/NO] ngasese umlingani wakho engazi, ukwazi ukuyisebenzisa ngasese umlingani wakho engazi, yehlisa amathuba akho woku khulelewa ngamaphesenti [PREGNANCY PREVENTION B] %. Futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION B] %, yona ibiza [PRICE B] randi. Ubungasebenzisa enye yalezizindlela ngenkathi ugcina ukuya ocansini noma ubungeke usebenzise intlobo yokuzivikela/ ikhondomu njengoba uye wenza ngenkathi ugcina ukuya ocansini?

DISPLAY IMAGE 12

Here are the products and this is what they do: Would you have used either of these products in your last sex act or would you have still done the same as you did the last time you had sex? Option A is a [PRODUCT A] that can [IF SECRECY A IS YES] cannot [IF SECRECY A NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION A] %, and reduces your risk of HIV by [HIV PREVENTION A], and will cost you [PRICE A], or would you have used Option B. This is a [PRODUCT B] that can [IF SECRECY B IS YES] cannot [IF SECRECY B NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION B] %, and reduces your risk of HIV by [HIV PREVENTION B], and will cost you [PRICE B]? Would you have used either of these the last time you had sex or would you have used a condom / not used a barrier method like you did last time you had sex?

Choice / Attribute	A	B	C: Neither
CHOICE	1	2	3

Nazi izinhlobo zokuvikela, futhi zisebenza lokhu: ubungathanda ukusebenzisa enya yalezizinhlobo ngenkathi ugcina ukuya ocansini noma ubungenza ngendlela obuwnze ngayo ekuqaleni?

138 Indlela yokuqala yi [PRODUCT A] (engasetshenziswa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY A YES/NO] ngasese umlingani wakho engazi, yehlisa amathuba akho wokukhulelwa [PREGNANCY PREVENTION A] %, futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION A] %, yona ibiza [PRICE A] randi. Noma bowungathanda ukusebenzisa indlela yesibili, [PRODUCT B] (ongayisebenzisa) OR (noma ongeke ukwazi ukuyisebenzisa) [SECRECY B YES/NO] ngasese umlingani wakho engazi, ukwazi ukuyisebenzisa ngasese umlingani wakho engazi, yehlisa amathuba akho woku khulelewa ngamaphesenti [PREGNANCY PREVENTION B] %. Futhi yehlisa incupheko yakho yokusuleleka ngesanduleli ngculaza [HIV PREVENTION B] %, yona ibiza [PRICE B] randi. Ubungasebenzisa enye yalezizindlela ngenkathi ugcina ukuya ocansini noma ubungeke usebenzise intlobo yokuzivikela/ ikhondomu njengoba uye wenza ngenkathi ugcina ukuya ocansini?

DISPLAY IMAGE 13

Here are the products and this is what they do: Would you have used either of these products in your last sex act or would you have still done the same as you did the last time you had sex? Option A is a [PRODUCT A] that can [IF SECRECY A IS YES] cannot [IF SECRECY A NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION A] %, and reduces your risk of HIV by [HIV PREVENTION A], and will cost you [PRICE A], or would you have used Option B. This is a [PRODUCT B] that can [IF SECRECY B IS YES] cannot [IF SECRECY B NO] be used without your partner knowing, it reduces your chance of getting pregnant by [PREGNANCY PREVENTION B] %, and reduces your risk of HIV by [HIV PREVENTION B], and will cost you [PRICE B]? Would you have used either of these the last time you had sex or would you have used a condom / not used a barrier method like you did last time you had sex?

Choice / Attribute	A	B	C: Neither
CHOICE	1	2	3

139	IS THIS FLIPCHART VERSION: : D, H, L, P, S, T?	No 0 Yes 1	[ ]	0→Q141

[ONLY FOR FLIPCHART VERSIONS: D, H, L, P, S, T]

140 Nazi izinhlobo zokuvikela, futhi zisebenza lokhu: ubungathanda ukusebenzisa enya yalezizinhlobo ngenkathi ugcina ukuya ocansini noma ubungenza ngendlela obuwnze ngayo ekuqaleni?

DISPLAY IMAGE 14

Here are the products and this is what they do: Would you have used either of these products in your last sex act or would you have still done the same as you did the last time you had sex?

Choice / Attribute	A	B	C: Neither
CHOICE	1	2	3

Determinants of women's demand for barrier methods for HIV prevention

141	GET PREFERED METHOD FROM Q 121	Male condom 1 Female condom 2 Diaphragm 3 Microbicides 4	[ ]	
	DISTRIBUTIONAL ATTRIBUTES Siyabonga kakhulu, ukundlula kulendima enzima kulenkulumiswano ebesinayo. Sesizobheka kakhulu manje ngendlela yokutholakala noma kwaziwe ngalezindlela esesikhulume ngazo (barrier methods) ekuvikeleni I HIV.			
142	Njengoba ushilo ukuthi uyathanda ukusebenzisa indlela zokuvikela i _____(FROM Q141) (HIV) ngabe kusasenjalo awukakashintshi. Thanks a lot for that, that was the most difficult part of this interview. Now we are going to do a similar exercise but this time it is about distribution and promotion of barrier methods for HIV prevention. You mentioned above that you think _____(FROM Q141) would be your preferred HIV prevention product, do you still feel that way?	No 0 Yes 1	[ ]	1→Q144
143	Eyiphi ocabanga noma okhetha ukuyisebenzisa? What do think is now the product you would prefer to use?	Male condom 1 Female condom 2 Diaphragm 3 Microbicides 4	[ ]	
144	Ubungayisebenzisa yini _____(FROM Q143 OR 141) ngenkathi ugcina ukuya ocansini? Would you have used _____(FROM Q143 OR Q141) the very last time you had sex?	No 0 Yes 1	[ ]	1→Q146
145	Uma isimo sakho besingaguquka esikhathathini esizayo futhi bewufuna ukuyisebenzisa inhlobo yokuvikela isandulela ngculaza. Yiziphi izinhlobo obowungazithanda? If your situation were to change in the future and you did want to use a product to prevent sexual transmission of HIV which of these methods would you prefer to use?	Male condom 1 Female condom 2 Diaphragm 3 Microbicides 4	[ ]	
146	WHAT IS HER PREFERRED BARRIER METHOD? CHECK 1ST Q145, IF EMPTY THEN CHECK Q143, IF EMPTY, THEN CHECK Q141	Male condom 1 Female condom 2 Diaphragm 3 Microbicides 4	[ ]	
147 a.	Bewungathanda ukuthola ___[FROM 146] endaweni eyodwa lapho ebewungathola khona ezinya izindlala zokuvikela isandulela ngculaza? Would you prefer to get ____[From 146] in the same place as you would get any of the other HIV prevention products?	No 0 Yes 1	a. [ ]	

148	Manje sizokhuluma ngendlela yokuvikela esetshenziswa kanye _____ (KUSUKELA FROM Q146) kulemibuzo elandelayo. Kukuphi la ucabanga ukuthi ungayithola khona_____? Esphaza, emtholampilo estolo noma ekhemisi?				
	DISPLAY IMAGE 15				
	Now please consider a single use _____ (FROM Q146) throughout the coming questions. Where would you prefer to get your single use _____? In a Spaza shop, a Clinic, a Supermarket, or in a chemist,?				
	Spaza shop	Clinic	Supermarket	Chemist	
	1	2	3	4	
149	Uthanda ukuyithola kanjani_____? eshelufini, emuntwini othengisayo esitolo, enkumbeni efihlakele noma emshinini wemali noma ebhokisini? **DISPLAY IMAGE 16** How would you like to collect your single use _____? From a shelf, from a person behind a counter, in a private room or from a dispensing machine or box?				

Other 96
Don't know/ Don't remember 98
Refuse to answer 99

Determinants of women's demand for barrier methods for HIV prevention

From a shelf	From a person behind a counter	In a private room	From a dispensing machine or box
1	2	3	4

150 Omuphi umlayezo ongcono ongcono ongabhalwa kwisisetshenziswa kanye kskho _____ ozokwnza? Bekungaba yilo: Ukuthuthukiswa kwabesimame, Uvikeleko lwesisu, Injabulo edlulele noma Uvikeleko lwesandulela ngculaza?

DISPLAY IMAGE 17

What would best message on the package of your single use _____ to make it most attractive for you and your partner to use? Would it be women's empowerment, pregnancy prevention, extra pleasure, HIV prevention?

Women's empowerment	Pregnancy prevention	Extra pleasure	HIV prevention
1	2	3	4

151 **Manje sizokwenza esinye isifundo esifana nesakuqala esinezindlela ezahlukile zokukhipha izivikelo zesandulela ngculazi. Kukuphi noma kukanjani lapho ungakwazi ukuthola isivikelo sakho se-HIV?** Now we are going to do another exercise like the previous one with different ways to distribute barrier methods for HIV prevention. Your choices in these questions are: where and how you would like to obtain your HIV prevention products.

152 **Iyiphi yalezizindlela ongathanda ukulanda isivikelo esisetshenziswa kanye_____? Kulendlela ka-A ungathanda ukulanda [SOURCE A] kusukela [COLLECTION METHOD A] ephaketheni elibhalwe [MESSAGE A] lizobiza [PRICE A]. Kulendleza ka-B ungathanda ukulanda [SOURCE B] kusukela [COLLECTION METHOD B] ephaketheni elibhalwe [MESSAGE B] lizobiza [PRICE B]. .**

DISPLAY IMAGE 18

Which of these ways would you prefer to collect your single use _____? In Option A you would collect your ___ in a [SOURCE A] from [COLLECTION METHOD A] in packaged for [MESSAGE A] and it would cost __[PRICE IN RAND]____ Rand

1	2

153 **Iyiphi yalezizindlela ongathanda ukulanda isivikelo esisetshenziswa kanye_____? Kulendlela ka-A ungathanda ukulanda [SOURCE A] kusukela [COLLECTION METHOD A] ephaketheni elibhalwe [MESSAGE A] lizobiza [PRICE A]. Kulendleza ka-B ungathanda ukulanda [SOURCE B] kusukela [COLLECTION METHOD B] ephaketheni elibhalwe [MESSAGE B] lizobiza [PRICE B]. .**

DISPLAY IMAGE 19

Which of these ways would you prefer to collect your single use _____? In Option A you would collect your ___ in a [SOURCE A] from [COLLECTION METHOD A] packaged for [MESSAGE A] and it would cost __[PRICE B]____ Rand In Option B you would collect your ___ in a [SOURCE B] from [COLLECTION METHOD B] packaged for [MESSAGE B] and it would cost __[PRICE B]____ Rand

1	2

154 **Iyiphi yalezizindlela ongathanda ukulanda isivikelo esisetshenziswa kanye_____? Kulendlela ka-A ungathanda ukulanda [SOURCE A] kusukela [COLLECTION METHOD A] ephaketheni elibhalwe [MESSAGE A] lizobiza [PRICE A]. Kulendleza ka-B ungathanda ukulanda [SOURCE B] kusukela [COLLECTION METHOD B] ephaketheni elibhalwe [MESSAGE B] lizobiza [PRICE B]. .**

DISPLAY IMAGE 20

Which of these ways would you prefer to collect your single use _____? In Option A you would collect your ___ in a [SOURCE A] from [COLLECTION METHOD A] packaged for [MESSAGE A] and it would cost __[PRICE B]____ Rand In Option B you would collect your ___ in a [SOURCE B] from [COLLECTION METHOD B] packaged for [MESSAGE B] and it would cost __[PRICE B]____ Rand

1	2	If Flipchart is version D,H, L, P, S, T →Q157

ZULU-21

Survey 18-10-2005

Other 96
Don't know/ Don't remember 98
Refuse to answer 99

155	Iyiphi yalezizindlela ongathanda ukulanda isivikelo esisetshenziswa kanye_____? Kulendlela ka-A ungathanda ukulanda [SOURCE A] kusukela [COLLECTION METHOD A] ephaketheni elibhalwe [MESSAGE A] lizobiza [PRICE A]. Kulendleza ka-B ungathanda ukulanda [SOURCE B] kusukela [COLLECTION METHOD B] ephaketheni elibhalwe [MESSAGE B] lizobiza [PRICE B]. . **DISPLAY IMAGE 21** Which of these ways would you prefer to collect your single use _____? In Option A you would collect your ___ in a [SOURCE A] from [COLLECTION METHOD A] packaged for [MESSAGE A] and it would cost __[PRICE B]____ Rand In Option B you would collect your ___ in a [SOURCE B] from [COLLECTION METHOD B] packaged for [MESSAGE B] and it would cost __[PRICE B]____ Rand		
	1	2	

157	RECORD SET NUMBER FROM BOTTOM RIGHT OF FLIP CHART	[ ]	
158	**Siyabonga ka khulu, lesi bekusigaba sokugcina sezithombe.** Thank you very much that was the last of these scenarios		

Determinants of women's demand for barrier methods for HIV prevention

	SECTION 4: EVALUATION QUESTIONS **Sesifike ekugcineni ngemibuzo nemibono ebesifuna ukuzazi. Ngaphambi kokuba ngihambe ngizothanda ukukubuza imibuzo emincane mayelana nezinto ebesikubuza zona. Lokhu akuphathelene nalokhu ebesikukhuluma kodwa ukusisisza ukuthi sibuze kanjani imibuzo ngokuzayo.** We have now come to the end of our survey questions, but before I leave I would like to ask you just a few questions about your experience with this questionnaire, this is no longer part of the survey but to help us improve how we ask these types of questions in the future			
159	**Lenkulumiswano besinayo beyinjani kuwe?** How did you find this interview generally?			
160	**Eyiphi imibuzo ebeyinzima?** Which questions did you find difficult?		a[ ] b[ ] c[ ] d[ ]	
161	**Beyikhona imibuzo engakuphathanga kahle?** Were there any questions that made you feel uncomfortable?	No 0 Yes 1	[ ]	0→Q163
162	**Eyiphi leyo mibuzo?** Which ones were they?		a[ ] b[ ] c[ ] d[ ]	
163	**Indlela imibuzo ebuzwe ngakhona? Beyilula,ixaka noma inzima?** What did you think of the scenarios we presented? Were they Easy, Confusing, Difficult?	Easy 1 Confusing 2 Difficult 3	[ ]	
164	**Beyinjani lemibuzo kuwe?** Were they Interesting or boring?	Interesting 1 Boring 2 Neither 3	[ ]	
165	**Beyiminingi noma imincane?** Were there too many or too few?	Too many 1 Too few 2 Neither 3	[ ]	
166	**a. Ingabe siyazi yini ukuthi i microbicide iyavimbela i HIV?** Do we know if microbicides prevent HIV?	No 0 Yes 1	[ ]	0→b.
	a1. Microbicides are currently being tested. Right now we do not know if they will prevent HIV.			
	b. Ingabe siyazi yini ukuthi i diapragm iyavimbela i HIV? Do we know if the diaphragm prevents HIV?	No 0 Yes 1	[ ]	0→167
	b1. The diaphragm is currently being tested. Right now we do not know if it will prevent HIV.			
167	**a. Unemibuzo ngalengxoxo ebesikhuluma ngayo?** Do you have any questions about this questionnaire?	No 0 Yes 1	[ ]	0→ 168
	b. Emiphi imibuzo onayo? What questions do you have?	[ ]		
168	**Siyabonga isikhathi sakho sokukhulumisana nathi. Besibuza imibuzo ngezindlela ezintsha zokuvikela l (HIV). Sithanda ukukukhumbuza ukuthi ama condom obaba no mama enza umsebenzi omkhulu ekuvikeleni i (HIV). Njengoba besishilo masiqala konke okushilo kuyaba yimfihlo, yithi kuphela esizokwazi ngezimpendulo osinike zona. Mangabe uneminye imibuzo ofisa ukuyibuza ungasabi ukuthinta l Reserch Project.** Thank you very much for your participation. We have been asking you questions about some new methods for HIV prevention; however we would like to remind you that only male and female condoms have shown any effectiveness against HIV transmission. As mentioned earlier all of your responses will be kept confidential, only the research team will have access to the answers. If you have any further questions, please feel free to contact the research project.			

Determinants of women's demand for barrier methods for HIV prevention

Interviewer feedback questions

THESE ARE TO BE COMPLETED DIRECTLY FOLLOWING THE INTERVIEWS BY THE INTERVIEWER

169	INTERVIEW END TIME		Hour [ ] Min. [ ]	
170	WAS THE INTERVIEW INTERRUPTED AT ALL?	No 0 Yes 1	[ ]	0→Q172
171	EXPLAIN ANY INTERRUPTIONS			
172	WERE THERE ANY OTHER PEOPLE AROUND DURING THE INTERVIEW?	No 0 Yes 1	[ ]	0→Q174
173	SPECIFY WHO			
174	WERE THERE ANY QUESTIONS THAT THE RESPONDENT HAD PROBLEMS ANSWERING?	No 0 Yes 1	[ ]	0→Q176
175	EXPLAIN			
176	WERE THERE ANY QUESTIONS THAT THE RESPONDENT SEEMED TO BE HOLDING BACK INFORMATION ON?	No 0 Yes 1	[ ]	0→Q178
177	EXPLAIN			
178	DID THE RESPONDENT APPEAR TO BE THINKING ABOUT EACH DISCRETE CHOICE SCENARIOS?	No 0 Yes 1	[ ]	
179	DID THE RESPONDENT SEEM TO SWITCH TO MAKE YOU HAPPY?	No 0 Yes 1	[ ]	
180	WERE THERE ANY POSITIVE EVENTS DURING THE INTERVIEW (EXPLAIN)?	No 0 Yes 1	[ ]	0→Q182
181	EXPLAIN			
182	a. WERE THERE ANY NEGATIVE EVENTS DURING THE INTERVIEW (EXPLAIN)?	No 0 Yes 1	[ ]	
	b. EXPLAIN			
183	ANY OTHER COMMENTS.	No 0 Yes 1	[ ]	0→END
184	COMMENTS			

Other 96
Don't know/ Don't remember 98
Refuse to answer 99

Appendix 6.2 Information sheet and informed consent form survey

Hello, my name is ….. I a working on a project for the Reproductive Health and HIV Research Unit and the London School of Hygiene and Tropical Medicine. I would like to invite you to participate in a research study on women from Ekurhuleni.

Why are we conducting this study?
Many women in South Africa are infected with HIV every day. In many cases it is because women find it difficult to persuade their partners to use condoms during sex. At the moment, the condom is the only reliable method of preventing HIV. Researchers are now trying to develop new methods of preventing HIV, called microbicides and the diaphragm, which can be used and controlled by women.

What is this study about?
This study aims to understand the reason that women use or do not use male or female condoms and the reasons they may decide to the use these newer methods, if they are found to be effective. We are interested in what you think about these new methods, where you would be interested in obtaining them, and how you thing they should be advertised. This study will provide us with important information necessary to facilitate access to barrier methods which women can use to protect themselves from HIV.

REMEMBER: WE ARE NOT PROVIDING ANY PRODUCTS FOR THIS STUDY

Who can take part?
You can take part if you:
- Are willing to answer survey questions
- Are between the age of 18 and 45
- Have had sexual intercourse at least once in the past 6 months

What do you have to do if you agree to take part?

Respond to survey questions.
You have been asked to respond to survey questions. The survey will take approximately 30 minutes of your time.

All questionnaires will be kept in a locked cabinet. No one except program staff will be able to view the material. After the research has been completed all completed questionnaires will be destroyed.

This information will be used by us to gain more insights into how to make it as easy as possible for women to gain access to HIV prevention.

Will the study benefit you?
There is no immediate benefit to you by participating in this part of the study. However, you will be given a phone card worth R20.00 as token of thanks for your participation.

What are the risks?
The interview may ask some personal questions, but because these interviews are confidential there are no risks to you in giving this information.

Will the information from this survey be confidential?
Yes, all results of the survey will be confidential. You will not be identified by name on any documentation. No one will have access to the questionnaires other than the researchers and all questionnaires will be destroyed at the end of the study.

What happens if you change your mind about taking part?
You can withdraw from the interview at any time without giving a reason. You can also choose not to answer any of the questions that you do not want to answer. Withdrawal from the interview or not answering specific questions will not negatively affect you.

What happens if I have any problems during the interview?
If you have a problem resulting from your participation in this interview, assistance is available from:

Fern Terris-Prestholt Visiting Research Fellow Reproductive Health and HIV Research Unit 11th Floor Nurses Home C H Baragwanath Hospital Soweto Tel: 011 933 1228 Cell: 072 9350393 (24 hours accessible) Fax: 011 933 1227	Dr Catherine McPhail Director: Adolescent Health Reproductive Health and HIV Research Unit 11th Floor Nurses Home C H Baragwanath Hospital Soweto Tel: 011 933 1228 Cell: 083 441 5415 (24 hours accessible) Fax: 011 933 1227
Prof Helen Rees Principal Investigator Reproductive Health and HIV Research Unit 11th Floor Nurses Home C H Baragwanath Hospital Soweto Tel: 011 933 1228 Cell: 083 572 2057 (24 hours accessible) Fax: 011 933 1227	Dr Lilani Kumaranayake Principal Investigator Health policy unit London School of Hygiene and Tropical Medicine Keppel Street WC1E 7HT Tel: 001-902 431-3686 (24 hours accessible) Fax: 001-902 431-3689
You may also discuss any concerns you might have regarding your participation with any of the nurses, counsellors or community health workers involved in the study. This study is conducted in accordance with the Department of Health Guidelines for the Good Practice in the Conduct of Clinical Trials in Human Participants in South (2000), and has received ethical approval from the University of the Witwatersrand, Human Research Ethics Committee: (Medical). If you have complaints about how you were treated or feel that the study has caused you harm please contact:	
Prof Peter Cleaton-Jones Chairperson for the Committee for Research on Human Subjects University of the Witwatersrand, Human Research Ethics Committee: (Medical) Tel: 011 717 2229	

STATEMENT OF INFORMED CONSENT

The participant must complete the following questions herself/with a staff member who did not administer the consent		
Have you had an opportunity to read the consent form/have it read to you?	YES	NO
Have you had an opportunity to ask questions and discuss this study?	YES	NO
Have you received satisfactory answers to all of your questions?	YES	NO
Have you received enough information about the study?	YES	NO
Do you understand the benefits of the study?	YES	NO
Do you understand the risks of the study?	YES	NO
Which study staff member have you spoken to about the study? PLEASE PRINT HIS/HER NAME:_____		
Do you understand that you are free to not answer any of the questions at any time without having to give a reason for not wanting to answer the question?	YES	NO
Do you understand that you are free to withdraw from the interview at any time without having to give a reason for withdrawing?	YES	NO
Do you agree to take part in this study?	YES	NO
If the participant answers NO to any of the above questions then she may not be enrolled in the study.		
Printed name of Investigator		Date
Signature of participant		Time

Do you agree to the interview being tape recorded?		YES	NO
Printed name of Investigator		Date	
Signature of participant		Time	

Appendix 7. Experimental design

Table A7-1 a. Physical attributes design

		Alternative A						Alternative B				
Block	DCEID	Product	Secrecy	Preg-nancy	HIV	Price		Product	Secrecy	Preg-nancy	HIV	Price
1	1	3	0	0.95	0.95	3		1	1	0.95	0.35	3
1	2	1	0	0.00	0.75	0		3	0	0.95	0.95	3
1	3	3	0	0.95	0.95	0		2	0	0.75	0.95	1
1	4	3	0	0.95	0.75	1		1	0	0.75	0.35	3
1	5	2	1	0.55	0.55	1		2	0	0.55	0.55	1
1	92	3	0	0.95	0.95	0		1	0	0.75	0.35	3
2	7	2	1	0.55	0.55	0		1	0	0.95	0.35	2
2	8	3	0	0.95	0.75	3		1	1	0.55	0.75	2
2	9	2	0	0.95	0.75	3		3	0	0.75	0.95	1
2	10	1	0	0.55	0.75	2		1	0	0.75	0.95	2
2	11	3	0	0.75	0.95	0		2	1	0.95	0.75	2
2	12	2	0	0.55	0.55	3		3	0	0.75	0.95	0
3	13	1	1	0.00	0.35	2		1	1	0.95	0.75	1
3	116	2	1	0.95	0.35	2		1	1	0.75	0.95	0
3	15	3	0	0.75	0.75	3		1	0	0.00	0.95	1
3	16	1	1	0.55	0.35	0		3	0	0.75	0.75	0
3	17	3	0	0.95	0.95	1		1	0	0.00	0.75	2
3	18	1	1	0.75	0.95	3		2	1	0.95	0.55	3
4	19	1	0	0.75	0.95	1		3	0	0.75	0.95	2
4	102	2	1	0.55	0.55	1		2	1	0.75	0.55	1
4	21	3	0	0.75	0.75	1		1	1	0.95	0.55	0
4	22	1	0	0.75	0.55	0		3	0	0.95	0.95	2
4	23	1	1	0.75	0.95	2		1	1	0.55	0.35	0
4	24	2	0	0.95	0.95	1		2	1	0.75	0.35	2
5	25	2	1	0.55	0.95	3		3	0	0.95	0.75	3
5	50	3	0	0.95	0.95	2		3	0	0.95	0.95	0
5	27	2	0	0.95	0.95	0		1	1	0.75	0.55	1
5	28	1	1	0.95	0.95	0		3	0	0.75	0.75	1
5	29	2	0	0.75	0.35	1		2	1	0.75	0.75	3
5	30	1	0	0.55	0.35	2		2	0	0.95	0.35	1
6	31	2	1	0.75	0.35	2		1	0	0.95	0.55	1
6	32	2	0	0.55	0.55	2		1	1	0.00	0.75	3
6	33	1	0	0.95	0.55	2		1	0	0.00	0.55	3
6	34	1	0	0.95	0.55	3		2	0	0.75	0.35	0
6	35	1	1	0.55	0.35	1		1	1	0.75	0.95	3
6	36	3	0	0.95	0.75	2		3	0	0.95	0.95	1
7	37	2	1	0.75	0.35	3		3	0	0.95	0.75	2
7	38	2	1	0.95	0.75	0		1	0	0.55	0.75	3
7	39	1	1	0.95	0.55	1		3	0	0.95	0.75	1
7	40	3	0	0.75	0.95	3		1	0	0.75	0.55	0
7	41	2	0	0.75	0.35	0		1	1	0.00	0.95	0
7	42	1	0	0.55	0.35	3		1	0	0.55	0.55	2
8	43	1	0	0.00	0.35	1		3	0	0.75	0.95	3
8	56	1	0	0.75	0.55	1		1	0	0.55	0.35	1
8	45	1	1	0.95	0.55	0		1	1	0.95	0.95	2
8	46	1	0	0.55	0.75	3		2	0	0.75	0.75	1
8	47	3	0	0.75	0.95	1		1	1	0.55	0.95	1
8	48	3	0	0.95	0.75	0		2	0	0.55	0.55	0
9	49	1	1	0.95	0.95	1		1	1	0.00	0.55	2

		Alternative A						Alternative B				
Block	DCEID	Product	Secrecy	Preg-nancy	HIV	Price		Product	Secrecy	Preg-nancy	HIV	Price
9	26	1	1	0.00	0.35	3		2	1	0.55	0.95	2
9	51	3	0	0.75	0.75	0		2	1	0.55	0.35	3
9	52	2	0	0.95	0.75	2		1	1	0.75	0.35	2
9	53	1	0	0.00	0.75	1		1	0	0.95	0.75	0
9	54	3	0	0.75	0.95	2		3	0	0.75	0.75	3
10	55	2	1	0.95	0.75	1		2	0	0.95	0.95	0
10	44	1	1	0.55	0.75	1		3	0	0.95	0.75	0
10	57	1	1	0.00	0.75	3		1	1	0.00	0.35	1
10	58	2	1	0.95	0.95	2		1	0	0.55	0.95	0
10	59	1	1	0.75	0.55	3		1	1	0.75	0.75	0
10	60	1	1	0.75	0.55	2		2	1	0.75	0.95	3
11	61	1	1	0.00	0.75	2		2	1	0.75	0.55	2
11	62	1	1	0.00	0.75	1		1	1	0.75	0.75	1
11	63	1	1	0.55	0.35	1		2	1	0.75	0.55	2
11	64	1	0	0.95	0.95	3		3	0	0.95	0.75	1
11	65	1	0	0.75	0.55	3		1	1	0.95	0.95	2
11	66	1	0	0.55	0.95	2		3	0	0.75	0.75	1
12	67	1	0	0.75	0.95	3		1	0	0.75	0.55	2
12	68	3	0	0.75	0.95	1		2	0	0.95	0.55	0
12	69	2	1	0.75	0.95	0		3	0	0.75	0.95	1
12	70	3	0	0.75	0.95	0		2	1	0.55	0.95	1
12	71	2	0	0.95	0.95	0		2	0	0.75	0.95	0
12	72	2	0	0.75	0.75	3		3	0	0.95	0.75	2
13	73	2	1	0.75	0.75	3		2	1	0.95	0.75	3
13	74	1	1	0.00	0.35	1		1	0	0.95	0.35	1
13	75	1	0	0.55	0.75	0		2	0	0.55	0.95	3
13	76	3	0	0.95	0.95	1		1	1	0.75	0.35	3
13	77	2	1	0.75	0.35	2		3	0	0.95	0.75	3
13	78	3	0	0.95	0.95	1		1	1	0.00	0.75	2
14	79	1	1	0.55	0.95	3		2	1	0.55	0.75	0
14	87	3	0	0.75	0.95	0		3	0	0.95	0.95	0
14	81	1	1	0.55	0.55	3		3	0	0.75	0.75	0
14	82	3	0	0.95	0.75	3		1	1	0.95	0.55	0
14	83	2	0	0.55	0.35	2		1	1	0.00	0.55	1
14	84	1	1	0.95	0.35	0		2	1	0.95	0.95	2
15	85	1	1	0.95	0.95	2		2	1	0.95	0.35	0
15	86	1	1	0.00	0.95	3		1	0	0.00	0.95	3
15	80	3	0	0.95	0.75	2		1	0	0.55	0.95	1
15	88	1	0	0.55	0.35	0		3	0	0.95	0.95	3
15	89	3	0	0.75	0.75	3		2	0	0.75	0.75	2
15	90	2	1	0.55	0.55	1		1	0	0.55	0.35	2
16	91	1	0	0.00	0.95	2		1	0	0.95	0.95	2
16	6	1	1	0.55	0.75	0		1	1	0.55	0.55	3
16	93	2	0	0.95	0.75	3		1	0	0.00	0.55	1
16	94	1	1	0.75	0.35	0		1	0	0.75	0.75	1
16	95	3	0	0.75	0.75	2		2	1	0.75	0.35	3
16	96	1	1	0.95	0.75	0		3	0	0.75	0.95	2
17	97	1	0	0.00	0.75	0		1	1	0.55	0.75	0
17	98	1	1	0.00	0.55	3		1	1	0.55	0.55	3
17	99	2	0	0.75	0.55	1		3	0	0.75	0.95	0
17	100	1	0	0.95	0.35	1		3	0	0.75	0.95	3
17	101	3	0	0.75	0.95	1		3	0	0.95	0.95	1
17	20	1	0	0.95	0.95	2		2	0	0.55	0.75	0
18	103	1	1	0.75	0.55	2		1	1	0.00	0.95	3
18	104	2	1	0.95	0.95	0		1	1	0.55	0.35	2

		Alternative A						Alternative B				
Block	DCEID	Product	Secrecy	Preg-nancy	HIV	Price		Product	Secrecy	Preg-nancy	HIV	Price
18	105	3	0	0.95	0.75	3		1	1	0.55	0.95	1
18	106	1	0	0.00	0.55	2		1	1	0.75	0.55	2
18	107	1	0	0.75	0.75	1		1	1	0.00	0.35	0
18	108	3	0	0.95	0.95	0		1	0	0.00	0.75	2
19	109	1	0	0.95	0.75	1		2	0	0.55	0.55	3
19	110	3	0	0.95	0.75	2		1	0	0.95	0.55	0
19	111	1	0	0.95	0.55	3		2	0	0.75	0.75	1
19	112	1	0	0.75	0.35	1		1	0	0.55	0.75	0
19	113	2	0	0.55	0.95	0		1	1	0.95	0.75	3
19	114	1	1	0.75	0.75	0		1	1	0.95	0.35	1
20	115	1	0	0.55	0.55	2		2	0	0.95	0.35	1
20	14	1	0	0.75	0.95	0		1	0	0.75	0.75	1
20	117	1	1	0.55	0.75	1		3	0	0.95	0.95	2
20	118	1	1	0.95	0.55	2		3	0	0.95	0.75	0
20	119	2	1	0.55	0.75	3		1	0	0.75	0.95	0
20	120	1	1	0.75	0.95	2		1	0	0.55	0.55	3

Table A7-2 b. Distribution attributes design

		Alternative A					Alternative B			
Block	DCEID	Outlet type	Collection method	Advert	Price		Outlet type	Collection method	Advert	Price
1	201	2	1	3	0		4	1	2	2
1	202	1	2	1	2		2	3	2	3
1	203	3	2	4	1		2	1	4	2
2	204	4	3	3	0		2	3	3	2
2	205	3	4	1	2		4	1	3	3
2	206	3	3	3	1		1	2	2	3
3	207	2	4	4	0		3	4	4	3
3	208	3	1	4	3		1	3	3	1
3	209	2	2	1	3		1	3	3	2
4	210	3	4	3	3		2	2	1	0
4	211	1	3	4	3		3	1	2	1
4	212	4	4	1	3		3	2	2	2
5	213	3	3	1	0		3	3	4	0
5	214	2	2	3	2		3	3	1	1
5	215	1	3	2	2		1	2	4	2
6	216	4	4	3	2		1	1	4	1
6	217	2	3	2	3		2	1	1	3
6	218	1	2	3	3		4	4	4	0
7	219	4	1	2	3		4	3	4	3
7	220	2	3	4	2		4	2	3	0
7	221	4	2	4	0		1	2	1	3
8	222	3	2	2	0		4	2	2	1
8	223	1	1	3	1		3	2	3	3
8	224	2	1	1	1		2	2	4	1
9	225	4	2	2	1		3	1	3	0
9	226	4	1	4	2		2	4	2	0
9	227	4	3	1	1		4	4	1	1
10	228	1	2	2	0		2	4	3	1
10	229	1	1	4	1		4	3	1	2
10	230	3	1	2	2		3	4	1	2
11	231	2	4	2	1		1	3	2	0
11	232	4	2	1	1		4	4	4	0
11	233	1	1	2	1		4	4	3	2

		Alternative A					Alternative B			
Block	DCEID	Outlet type	Collection method	Advert	Price		Outlet type	Collection method	Advert	Price
12	234	1	2	4	3		1	3	3	1
12	235	2	3	1	3		4	1	3	1
12	236	4	1	4	2		4	2	2	1
13	237	3	3	3	0		4	3	2	2
13	238	1	3	4	1		3	1	2	3
13	239	3	1	2	1		2	3	1	1
14	240	2	1	3	3		3	4	2	0
14	241	4	2	2	0		1	1	2	2
14	242	4	4	3	1		3	1	1	1
15	243	1	2	3	2		4	2	1	3
15	244	4	3	1	3		2	2	1	2
15	245	2	2	2	0		3	2	4	1
16	246	4	3	2	2		3	3	3	0
16	247	1	3	2	3		2	2	2	0
16	248	2	3	2	2		1	2	1	3
17	249	3	1	1	0		3	2	3	3
17	250	3	4	1	2		1	1	2	1
17	251	2	4	3	1		1	2	3	2
18	252	2	2	1	1		2	3	2	3
18	253	3	4	2	3		4	1	4	3
18	254	4	4	4	0		2	4	3	3
19	255	4	1	3	3		1	3	4	3
19	256	3	2	3	2		2	1	3	0
19	257	2	4	4	0		4	3	1	0
20	258	3	2	4	3		3	4	1	2
20	259	1	1	1	2		3	3	4	2
20	260	3	3	4	1		1	2	4	0

Appendix 8. Evaluation survey tool

1.	Cluster:		
2.	Household number:		
3.	Interviewed by:		
4.	Date:		
5.	Start Time:		
6.	You have been interviewed about new barrier methods for HIV prevention. Some of the questions were pictures, like these. Some women have found them quite difficult. We would like to have a short 10-minute discussion about these pictures. The questions I will be asking will not be intimate like the previous questions.		
7.	Do you agree to participate in this short evaluation?	No 0 Yes 1	[ ]
7a	Do you agree to this discussion being recorded?	No 0 Yes 1	[ ]

1.	Lets start with the **female condom**. Can you tell me every thing you remember about the female condom		Incorrect 0 Correct 1
8.	a. Prevents HIV	Spontaneous	
	1. Why would you use it?	*Prompted*	
8.	b. Prevents pregnancy	Spontaneous	
	1. Why else would you use it?	*Prompted*	
8.	c. Insert by twisting to a figure 8	Spontaneous	
	1. How do you use it?	*Prompted*	
8.	d. Twist before removing	Spontaneous	
	1. How do you remove it?	*Prompted*	
8.	e. Can be used for up to 7 times if necessary	Spontaneous	
	1. Is it for single use or can it be reused?	*Prompted*	
8.	f. Cannot be used in secret	Spontaneous	
	1. Can you use it without your partner knowing?	*Prompted*	
8.	g. Can be left in for up to 6 hours	Spontaneous	
	1. How long can you keep the female condom inside you?	*Prompted*	
	h. Other		
	i. Comments		

	Now lets talk about the **diaphragm**. Can you tell me what you remember about it?		Incorrect 0 Correct 1
9.	a. Prevents HIV	Spontaneous	
	1. Why would you use it?	*Prompted*	
9.	b. Prevents pregnancy	Spontaneous	
	1. Why else would you use it?	*Prompted*	
9.	c. Insert it into the vagina	Spontaneous	
	1. How do you use it?	*Prompted*	
	d. Use a finger to remove	Spontaneous	
	1. How do you remove it?	*Prompted*	
9.	e. Can be used for up to 2 years	Spontaneous	
	1. Is it for single use or can it be reused?	*Prompted*	
9.	f. Can possibly be used in secret	Spontaneous	
	1. Can you use it without your partner knowing?	*Prompted*	
9	g. Can be left in for up to 24 hours	Spontaneous	
	1. How long can you keep the diaphragm inside you?	*Prompted*	
9	h. Still being tested	Spontaneous	
	1. Do we already know if the diaphragm provides any protection against HIV?	*Prompted*	
9	i. Other _____		
9	j. Comments		

	Now lets talk about **microbicides**. Can you tell me what you remember about them?		Incorrect 0 Correct 1
10	a. Prevents HIV	Spontaneous	
	1. Why would you use it?	*Prompted*	
10	b. SOME might prevent pregnancy, but not all	Spontaneous	
	1. Why else would you use it?	*Prompted*	
10	c. Insert within an hour of sex	Spontaneous	
	1. when do you insert it?	*Prompted*	
10	d. Gel	Spontaneous	
	1. What is inside the tube?	*Prompted*	
10	e. Single use	Spontaneous	
	1. Is it for single use or can it be reused?	*Prompted*	
10	f. Can possibly be used in secret	Spontaneous	
	1. Can you use it without your partner knowing?	*Prompted*	
10	h. Still being tested	Spontaneous	
	1. Do we already know if microbicides provide any protection against HIV?	*Prompted*	
10	i. Other _____		
10	j. Comments		

8.	What does this picture represent? [SECRECY YES]		
9.	What does this picture represent? [SECRECY NO]		
	If wrong: did the interviewer mention anything about being able to use the product without your partner's knowledge?	No 0 Yes 1	[ ]
10.	What does this represent? [Pregnancy]		
14	a. Which provides stronger protection against pregnancy?		
11.	What does this represent? [HIV]		
14	a. Which provides stronger protection against HIV?		
15.	Now you were given 3 options. What does column C mean?		
16.	Did you keep your last sex act in mind when answering these questions?	No 0 Yes 1	[ ]
17.	Now lets pretend that you are interviewing me. Can you explain to me, what I am supposed to do with these pictures?		
18.	Thanks a lot, now we will move the next set of images. What are these questions about? -Where and how I would like to collect my HIV prevention product		
19.	What are these [Source]?		
20.	What are these [Collection method]		
21.	What does this mean [package message HIV]		
22.	What does this mean [package message women's empowerment]		
23.	What does this mean [package message more pleasure]?		
24.	What does this mean [package message pregnancy prevention]?		
25.	Thank you very much for assisting us by answering these questions. Do you have any comments about your interview that you would like to share with us?		

Appendix 9. On the concept of SES and poverty

SES is frequently used in sociological research, for example on social mobility and social stratification. There are numerous names for and definitions of socio-economic status (see Box A9-1). In general the concept should incorporate 'access to resources' and 'relative position in the society'. This second part is important, as it defines SES as a relative concept. Within a community or society, there will be a range of SES'. Given this, measurement of SES is concerned with intra-site variation, rather than with measuring inter-site variation.

Box A9-1 Socio-economic status: terms and definitions

Terms for SES

Social class, social status, social stratification, social inequality, socio-economic status and socio-economic position.

Definitions of SES

Oakes and Rossi (2003): Differential access (realized and potential) to desired resources.
SES= f(Material capital, human capital, social capital)

Wohlfarth (1997): Amount of socially valued 'good' possessed by a person.

Hauser and Warren (1997): Characterisation of the placement of persons, families, or neighbourhoods with respect to the capacity to consume valued goods.

Krieger, et al (1997): Relative position in socially ranked hierarchies and chiefly concern status in relation to access to and consumption of goods, services, and knowledge.

Nock and Rossi (1979): The dimension of stratification which translates the objective distribution of societal resources into meaningful perceptions of relative desirability.

Lynch and Kaplan (2000): Socio-economic position the social and economic factors that influence what position(s) individuals and groups hold within the structure of society.

In this thesis the framework defined by Oakes and Rossi (2003) will be applied [476]. They reviewed literature in search of conceptual clarity and a theoretical basis for SES. In doing so they reviewed SES indicators used through time, but limited to developed countries.

> "For the most part, then, SES measurement today relies almost entirely on data from occupational position, education and/or income. ....But whereas the task of traditional stratification research is to describe the structure of social stratification and to specify the processes by which it is generated and maintained, public health research aims to investigate how levels of inequality and variation in social context affect health outcomes. SES measure in public health may thus need to capture more of the social context than indexes of income, education or occupation position can offer." [476].

After criticising existing measures, they propose a framework for a new composite measure consisting of three types of capital: material capital, human capital and social capital. (see upper part of Figure A9-1).

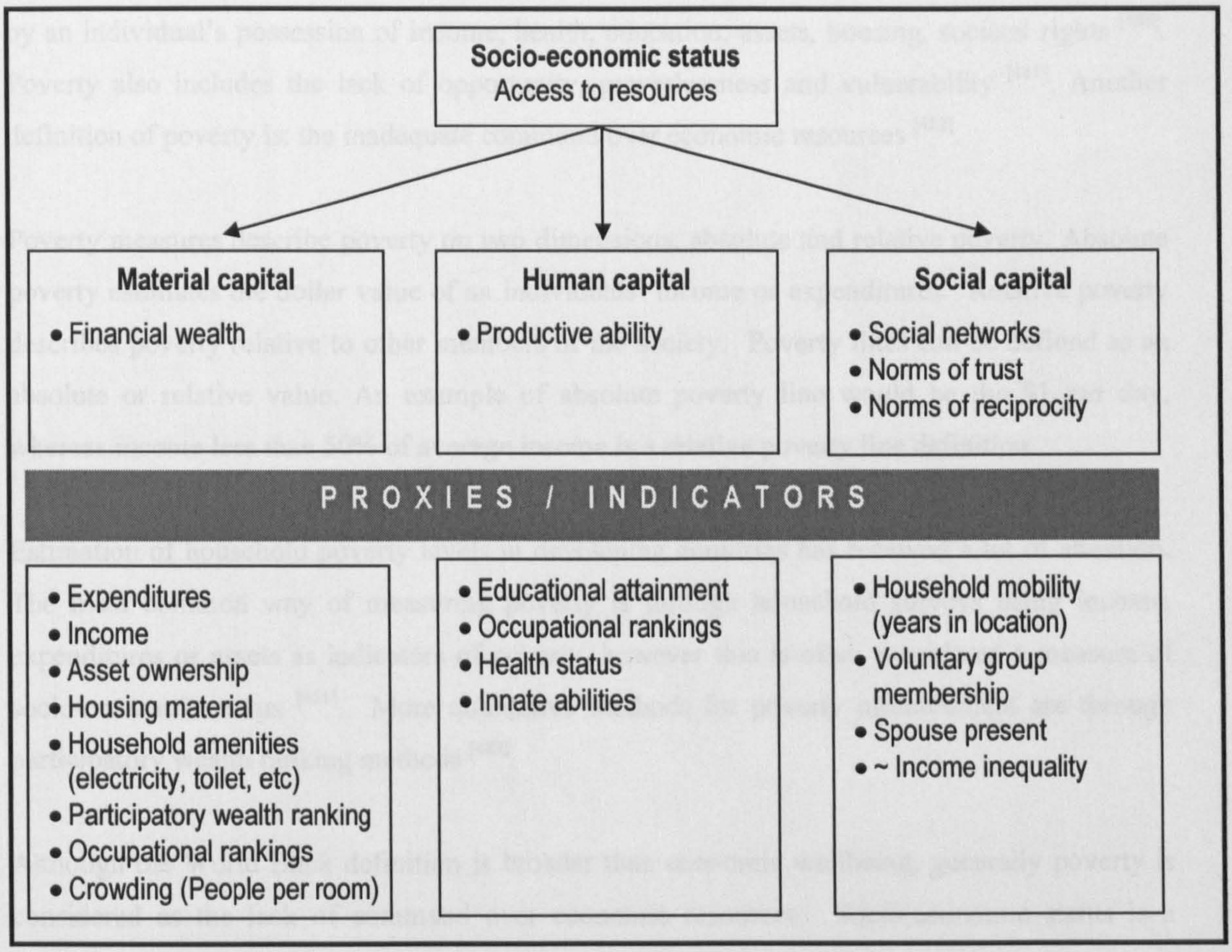


Figure A9-1 Conceptual framework for this socio-economic status index

Material capital refers to financial well-being, such as income and expenditure (flow variables) and assets, household amenities (such as flush toilet, electricity, etc), (stock variables), and more. Human capital can be defined as: the knowledge, skills, and experience of people that make them economically productive. Human capital can be increased by investing in education, health care, and job training[477]. Social capital is very difficult to measure and has not frequently been included as a measurable component of SES. It incorporates social networks, norms of trust, and norms of reciprocity[478, 479]. Studies of social capital have tended to stand on their own. Surveys to measure social capital tend to be rather intensive and subjective. One of the indicators used is duration of residence in a certain location/area. In this survey the question "If a person became ill in your home and R100 was needed to pay for treatment or medicines, how easy would it be for you to find the money: very easy, easy, quite difficult or very difficult?" was included with the aim of capturing social capital.

3.1.1.1 Poverty

Although we are focusing on SES, it might be good to understand the concept of 'poverty'. The World Bank (2000) defined poverty as the deprivations of well-being. Well being is measured by an individual's possession of income, health, education, assets, housing, societal rights [480]. Poverty also includes the lack of opportunity, powerlessness and vulnerability [481]. Another definition of poverty is: the inadequate command over economic resources [482].

Poverty measures describe poverty on two dimensions: absolute and relative poverty. Absolute poverty estimates the dollar value of an individuals' income or expenditures. Relative poverty describes poverty relative to other members of the society. Poverty lines can be defined as an absolute or relative value. An example of absolute poverty line would be the $1 per day, whereas income less than 50% of average income is a relative poverty line definition.

Estimation of household poverty levels in developing countries has received a lot of attention. The most common way of measuring poverty is through household surveys using income, expenditures or assets as indicators of poverty, however this is often considered a measure of socio-economic status [451]. More qualitative methods for poverty measurement are through participatory wealth ranking methods [483].

Although the World Bank definition is broader than economic wellbeing, generally poverty is considered as the lack of command over economic resources. Socio-economic status is a broader concept encompassing both access to financial wealth and other 'desirable' resources.

Appendix 10. Determinants of WTP intermediate results

Table A10-1 Specification of the WTP intervals in the interval regression

		Lower limit	Upper limit	N=	% responses
Payment scale responses					
Single use	0	Unknown	4	507	50%
	5	5	9	269	26%
	10	10	19	149	15%
	20	20	Unknown	92	9%
Reusable	0	Unknown	19	270	27%
	20	20	39	442	43%
	40	40	79	173	17%
	80	80	Unknown	132	13%
Open ended WTP response intervals					
Diaphragm		Unknown and 0	0	73	12%
		1	4	21	3%
		5	9	53	9%
		10	19	91	15%
		20	29	132	22%
		30	49	55	9%
		50	99	119	20%
		100	450	65	11%
Microbicide		Unknown and 0	0	141	19%
		1	4	53	7%
		5	9	140	19%
		10	14	126	17%
		15	19	40	5%
		20	29	115	15%
		30	49	59	8%
		50	300	74	10%
Female condom		Unknown and 0	0	119	23%
		1	4	54	10%
		5	9	128	25%
		10	19	132	26%
		20	39	52	10%
		40	250	30	6%

For the open-ended WTP questions, it was not clear where to limit the intervals as it is a continuous variable. It was assumed that the intervals were up to the next round increment. For the lower limit on 0, it is expected that the lower limit is 0, but in the same light as the Tobit model is explored, we explore the same concept (i.e. that 0 might represent a whole range of negative values as well as 0) by estimating the interval models with the lower limit of the first interval both as unknown and as 0.

Table A10-2 Determinants of WTP-Full regressions

OLS Values	Diaphragm Coef.	Diaphragm P>|t|	Microbicide Coef.	Microbicide P>|t|	Female condom Coef.	Female condom P>|t|	Single use Coef.	Single use P>|t|	Reusable Coef.	Reusable P>|t|
seshh[2]	7.588	***<0.01***	4.227	***<0.01***	1.785	***0.01***	0.482	***0.04***	4.029	***<0.01***
age	-0.547	***0.05***	-0.476	***<0.01***	-0.250	***0.04***	-0.078	***0.01***	-0.480	***<0.01***
EducYrs	0.560	0.33	0.194	0.53	0.198	0.35	0.190	***0.01***	0.454	***0.09***
employd	8.202	***0.07***	7.386	***0.01***	4.151	***0.02***	0.226	0.61	1.120	0.55
YrsinLoc	0.069	0.69	0.088	0.38	0.030	0.66	-0.033	***0.06***	0.120	0.11
FCEvUs	-13.853	***0.06***	-5.230	0.14	-1.688	0.52	0.534	0.58	0.053	0.99
DontWantPreg	-0.660	0.86	-0.953	0.62	-2.196	0.19	-0.807	***0.04***	-3.776	***0.02***
MCEvrUse	-4.503	0.39	4.720	***0.07***	0.459	0.86	-0.686	0.20	-3.954	***0.07***
PaidMCS	5.715	0.42	-0.932	0.84	-4.446	0.14	0.078	0.92	-0.189	0.95
IntiatMCS	4.023	0.43	3.951	0.20	0.451	0.83	1.023	***0.04***	4.920	***0.02***
DiffMC	-1.162	0.77	-0.070	0.98	-1.749	0.32	-0.588	0.16	-1.085	0.52
MCLastS	-1.403	0.74	-0.322	0.91	-0.924	0.75	-0.196	0.71	2.687	0.18
SexDeb	0.729	0.40	-0.822	0.13	-0.575	0.24	-0.093	0.27	0.152	0.65
Cohab	6.786	***0.07***	4.651	***0.06***	-1.883	0.35	0.483	0.29	-0.766	0.66
RiskHigh	3.064	0.50	1.315	0.55	4.515	***0.03***	0.093	0.87	3.664	***0.10***
RiskMed	1.834	0.67	0.116	0.96	2.654	***0.09***	0.174	0.74	1.727	0.40
RiskNo	10.911	***0.07***	5.221	***0.10***	4.945	***0.05***	0.231	0.67	2.850	0.18
_cons	25.649	0.16	33.794	***<0.01***	25.014	***0.05***	7.641	***<0.01***	32.980	***<0.01***
n=	599		731		504		994		994	
r^2	0.071		0.089		0.056		0.048		0.080	
RESET p-value	0.308		<0.01		<0.001		0.080		0.075	

OLS Logarithms	Diaphragm Coef.	Diaphragm P>t	Microbicide Coef.	Microbicide P>t	Female condom Coef.	Female condom P>t	Single use Coef.	Single use P>t	Reusable Coef.	Reusable P>t
seshh	0.189	***<0.01***	0.231	***<0.01***	0.158	***<0.01***	0.055	***0.05***	0.117	***<0.01***
age	-0.018	***0.01***	-0.020	***0.01***	-0.012	***0.08***	-0.012	***<0.01***	-0.010	***<0.01***
EducYrs	-0.015	0.36	-0.007	0.65	0.010	0.55	0.017	***0.07***	0.001	0.92
employd	0.152	0.17	0.200	***0.04***	0.186	0.11	0.104	***0.07***	0.026	0.58
YrsinLoc	-0.001	0.85	0.009	***0.04***	0.009	***0.03***	0.001	0.82	0.003	***0.08***
FCEvUs	-0.386	0.14	0.100	0.60	0.033	0.87	-0.169	0.15	0.054	0.66
DontWantPreg	0.141	0.14	0.027	0.75	-0.062	0.55	0.048	0.33	-0.027	0.50
MCEvrUse	-0.088	0.52	0.216	***0.08***	0.005	0.97	-0.054	0.43	-0.098	***0.08***
PaidMCS	0.343	***0.03***	-0.126	0.48	-0.353	***0.06***	-0.052	0.54	0.022	0.76
IntiatMCS	0.069	0.59	0.087	0.45	0.040	0.74	0.026	0.66	0.086	***0.09***
DiffMC	-0.089	0.39	-0.154	***0.10***	-0.065	0.52	0.037	0.48	-0.009	0.83
MCLastS	-0.079	0.53	-0.085	0.45	0.006	0.96	0.028	0.66	0.073	0.14
SexDeb	0.026	0.20	-0.025	0.18	-0.010	0.62	-0.003	0.82	0.005	0.60
Cohab	0.153	0.16	0.179	***0.08***	0.019	0.87	0.125	***0.03***	0.021	0.65
RiskHigh	-0.016	0.91	-0.020	0.87	0.158	0.28	0.011	0.88	0.119	***0.04***
RiskMed	0.046	0.73	-0.059	0.61	0.147	0.23	-0.014	0.82	0.040	0.44
RiskNo	0.128	0.31	0.132	0.27	0.368	***0.01***	0.114	***0.09***	0.133	***0.02***
_cons	3.247	***<0.01***	3.252	***<0.01***	2.294	***<0.01***	2.161	***<0.01***	3.491	***<0.01***
n=	529		595		390		498		732	
r^2	0.070		0.102		0.087		0.0755		0.081	
RESET p-value	0.58		0.45		0.66		0.3876		0.1137	

[2] Variable names can be found at the end of the table.

TOBIT	Diaphragm Coef.	P>|t|	Microbicide Coef.	P>|t|	Female condom Coef.	P>|t|	Single use Coef.	P>|t|	Reusable Coef.	P>|t|
seshh	8.697	***<0.01***	5.112	***<0.01***	1.853	0.12	0.766	***0.08***	4.680	***<0.01***
age	-0.695	***0.03***	-0.520	***0.01***	-0.409	***0.01***	-0.106	***0.07***	-0.599	***<0.01***
EducYrs	0.946	0.20	0.484	0.26	0.428	0.24	0.350	***0.01***	0.770	***0.04***
employd	8.356	***0.08***	8.341	***<0.01***	4.682	***0.04***	0.115	0.89	1.312	0.58
YrsinLoc	0.057	0.78	0.052	0.67	0.064	0.46	-0.072	***0.03***	0.138	0.14
FCEvUs	-16.692	0.18	-6.751	0.38	-0.716	0.90	2.374	0.26	-1.300	0.83
DontWantPreg	-2.249	0.59	-2.355	0.32	-3.007	0.14	-2.164	***<0.01***	-5.613	***0.01***
MCEvrUse	-4.752	0.42	5.060	0.13	0.857	0.76	-1.145	0.27	-4.470	0.12
PaidMCS	6.589	0.40	-2.031	0.63	-5.540	0.14	0.266	0.84	-0.412	0.91
IntiatMCS	4.310	0.42	4.637	0.13	0.525	0.83	2.067	***0.03***	6.258	***0.02***
DiffMC	-0.516	0.91	0.630	0.81	-1.675	0.45	-1.474	***0.07***	-1.560	0.48
MCLastS	-1.792	0.74	1.279	0.68	-0.308	0.90	-0.383	0.68	3.020	0.25
SexDeb	0.826	0.36	-0.918	***0.09***	-0.779	***0.07***	-0.208	0.21	0.121	0.79
Cohab	7.249	0.12	4.676	***0.09***	-1.581	0.48	0.434	0.60	-1.664	0.47
RiskHigh	4.469	0.45	1.987	0.56	5.340	***0.07***	0.164	0.88	3.870	0.19
RiskMed	2.307	0.68	-0.981	0.76	3.490	0.21	0.551	0.58	2.383	0.39
RiskNo	13.189	***0.02***	5.398	***0.10***	4.663	***0.10***	0.015	0.99	2.205	0.43
_cons	20.797	0.30	29.896	***0.01***	26.832	***<0.01***	6.458	***0.07***	30.315	***<0.01***
n=	599		731		504		994		994	
Pseudo r^2	0.009		0.012		0.009		0.011		0.011	
Sigma	48.23		30.42		21.05		10.20		30.40	

With 0 as [0,0]

Interval regression	Diaphragm Coef.	P>|z|	z	Microbicide Coef.	P>|z|	Female condom Coef.	P>|z|	Single use Coef.	P>|z|	Reusable Coef.	P>|z|
seshh	6.898	***<0.01***		3.600	***<0.01***	1.290	***0.02***	0.551	***0.03***	4.612	***<0.01***
age	-0.645	***0.01***		-0.262	***0.02***	-0.214	***0.01***	-0.085	***0.01***	-0.518	***<0.01***
EducYrs	0.193	0.82		0.048	0.44	0.249	0.15	0.206	***0.01***	0.489	***0.09***
employd	6.901	***0.03***		3.231	***0.03***	2.579	***0.05***	0.333	0.49	1.214	0.56
YrsinLoc	0.052	0.71		0.026	0.97	0.065	0.17	-0.036	***0.06***	0.144	***0.08***
FCEvUs	-12.076	0.91		-0.397	0.79	0.400	0.87	0.653	0.56	0.468	0.93
DontWantPreg	2.710	0.24		-1.529	0.13	-1.093	0.33	-0.869	***0.04***	-4.022	***0.02***
MCEvrUse	0.848	0.13		2.680	0.19	-0.913	0.55	-0.713	0.22	-4.153	***0.08***
PaidMCS	8.931	0.53		-1.593	0.45	-4.105	***0.04***	0.010	0.99	0.221	0.95
IntiatMCS	0.722	0.23		2.140	0.22	0.742	0.57	1.116	***0.04***	5.252	***0.02***
DiffMC	0.586	0.75		-0.435	0.98	-0.667	0.54	-0.582	0.20	-1.073	0.56
MCLastS	-5.029	0.83		0.377	0.55	1.330	0.37	-0.177	0.76	2.914	0.19
SexDeb	1.201	0.43		-0.211	0.44	-0.166	0.47	-0.101	0.26	0.137	0.71
Cohab	5.388	0.26		1.726	0.37	-0.101	0.93	0.519	0.29	-1.195	0.54
RiskHigh	1.344	0.63		0.872	0.56	3.018	***0.05***	0.091	0.88	4.061	***0.10***
RiskMed	2.172	0.52		-1.119	0.40	2.754	***0.05***	0.238	0.67	1.856	0.42
RiskNo	5.439	0.54		1.079	0.61	2.525	***0.07***	0.358	0.54	3.252	0.17
_cons	25.495	***<0.01***		24.485	***<0.01***	15.540	***<0.01***	10.109	***<0.01***	45.053	***<0.01***
n=	599			731		504		994		994	
Pseudo r^2	0.079			0.073		0.055		0.024		0.036	
Sigma	34.40			16.52		11.14		6.28		25.45	

Interval regression	With 0 as [.,0] Diaphragm Coef.	P>|z|	Microbicide Coef.	P>|z|	Female condom Coef.	P>|z|
seshh	7.890	***<0.01***	4.253	***<0.01***	1.366	***0.06***
age	-0.770	***<0.01***	-0.294	***0.02***	-0.315	***<0.01***
EducYrs	0.468	0.41	0.207	0.44	0.410	***0.09***
employd	7.200	***0.08***	3.849	***0.03***	2.958	***0.08***
YrsinLoc	0.045	0.80	0.004	0.97	0.089	0.15
FCEvUs	-14.403	0.13	-1.284	0.79	0.961	0.77
DontWantPreg	1.654	0.62	-2.424	0.13	-1.584	0.27
MCEvrUse	0.863	0.86	2.937	0.19	-0.783	0.70
PaidMCS	9.661	0.16	-2.276	0.45	-5.013	***0.05***
IntiatMCS	0.811	0.86	2.607	0.22	0.869	0.60
DiffMC	1.203	0.75	-0.053	0.98	-0.646	0.65
MCLastS	-5.568	0.21	1.283	0.55	1.860	0.32
SexDeb	1.319	***0.07***	-0.253	0.44	-0.282	0.34
Cohab	5.836	0.13	1.723	0.37	0.168	0.91
RiskHigh	2.351	0.63	1.332	0.56	3.678	***0.06***
RiskMed	2.509	0.60	-1.793	0.40	3.382	***0.06***
RiskNo	7.146	0.12	1.095	0.61	2.358	0.21
_cons	21.925	0.16	22.559	***<0.01***	16.483	***0.01***
n=	599		731		504	
Pseudo r^2	0.067				0.053	
sigma	38.76		20.04		14.10	

Seshh: household socio-economic status; **age**: age; **EducYrs** level of education; **employd**: employment status; **YrsinLoc**; Years living in location; **FCEvUs**: ever use of a female condom; **DontWantPreg**: desire not to get pregnant; **MCEvrUse**: male condom ever use; **PaidMCS**: whether they had ever paid for male condoms; **InitiateMC**: if they had initiated condom use themselves the last time they used a condom; **DiffMC**: having ever experienced difficulties negotiating condom use; **MCLastS**: condom use at last sex act; **SexDeb**: age at sexual debut; **Cohab**: if they are living with a sexual partner.; **RiskHigh**, **RiskMed**, **RiskNo**, relative to RiskLow their self perceived risk of HIV- high, medium, or none, relative to low.

Table A10-3 Determinants of WTP- Reduced regressions

OLS	Diaphragm		Microbicide		Female condom		Single use		Reusable	
Values	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|
seshh[3]	8.372	***<0.01***	4.295	***<0.01***	1.882	***<0.01***	0.647	***<0.01***	4.738	***<0.01***
age	-0.557	***0.03***	-0.513	***<0.01***	-0.306	***0.01***	-0.112	***<0.01***	-0.505	***<0.01***
employd	9.168	***0.04***	7.442	***0.01***	4.250	***0.01***	0.471	0.28	1.941	0.28
FCEvUs	-13.141	***0.07***	-5.155	0.13	-2.077	0.39	0.201	0.83	-0.392	0.93
MCEvrUse	-4.572	0.30	4.733	***0.03***	0.332	0.86	-0.575	0.25	-2.023	0.29
PaidMCS	5.116	0.46	-1.506	0.74	-4.349	0.14	0.255	0.73	0.093	0.98
IntiatMCS	3.569	0.42	4.167	0.17	0.329	0.86	0.865	***0.07***	4.030	***0.04***
Cohab	6.155	***0.08***	4.308	***0.08***	-1.567	0.32	0.587	0.17	-1.313	0.44
RiskNo	9.447	***0.07***	4.474	0.11	2.520	0.25	0.091	0.84	1.916	0.29
_cons	45.784	***<0.01***	23.225	***<0.01***	18.978	***<0.01***	7.702	***<0.01***	41.444	***<0.01***
n=	606		745		514		1012		1012	
R^2	0.066		0.083		0.041		0.028		0.064	
RESET p-value*	0.028		0.000		0.686		0.017		0.008	

OLS	Diaphragm		Microbicide		Female condom		Single use		Reusable	
Logarithms	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|
seshh	0.174	***<0.01***	0.218	***<0.01***	0.181	***<0.01***	0.075	***<0.01***	0.117	***<0.01***
age	-0.016	***0.02***	-0.017	***0.01***	-0.010	0.12	-0.012	***<0.01***	-0.009	***<0.01***
employd	0.141	0.19	0.214	***0.02***	0.195	***0.08***	0.117	***0.03***	0.030	0.51
FCEvUs	-0.348	0.18	0.105	0.59	0.021	0.92	-0.145	0.19	0.072	0.54
MCEvrUse	-0.128	0.28	0.204	***0.07***	0.027	0.82	-0.037	0.57	-0.060	0.23
PaidMCS	0.345	***0.03***	-0.156	0.36	-0.310	***0.08***	-0.028	0.74	0.014	0.84
IntiatMCS	0.041	0.73	0.059	0.59	0.014	0.90	0.031	0.59	0.077	0.11
Cohab	0.172	***0.09***	0.163	***0.09***	-0.020	0.85	0.097	***0.07***	-0.006	0.88
RiskNo	0.126	0.21	0.167	***0.09***	0.278	***0.01***	0.102	***0.06***	0.098	***0.04***
_cons	3.531	***<0.01***	2.688	***<0.01***	2.309	***<0.01***	2.340	***<0.01***	3.647	***<0.01***
n=	533		604		395		508		744	
R^2	0.058		0.085		0.067		0.059		0.066	
RESET p-value*	0.783		0.673		0.240		0.210		0.027	

OLS	Diaphragm		Microbicide		Female condom		Single use		Reusable	
Log (WTP+1)	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|
seshh	0.276	***<0.01***	0.271	***<0.01***	0.167	***<0.01***	0.097	***0.01***	0.218	***<0.01***
age	-0.029	***<0.01***	-0.021	***0.01***	-0.029	***<0.01***	-0.016	***<0.01***	-0.026	***<0.01***
employd	0.147	0.25	0.252	***0.02***	0.205	***0.09***	0.052	0.53	0.119	0.30
FCEvUs	-0.442	0.18	-0.055	0.85	0.082	0.77	0.220	0.27	-0.191	0.53
MCEvrUse	-0.159	0.28	0.204	***0.10***	0.072	0.60	-0.083	0.38	-0.019	0.88
PaidMCS	0.344	***0.09***	-0.154	0.40	-0.273	0.16	0.062	0.65	0.035	0.84
IntiatMCS	0.082	0.56	0.108	0.38	-0.012	0.92	0.178	***0.05***	0.179	0.14
Cohab	0.104	0.40	0.062	0.56	-0.033	0.78	0.056	0.48	-0.149	0.17
RiskNo	0.273	***0.03***	0.141	0.21	0.039	0.75	-0.032	0.71	-0.042	0.72
_cons	3.641	***<0.01***	2.473	***<0.01***	2.597	***<0.01***	1.553	***<0.01***	3.354	***<0.01***
n=	606		745		514		1012		1012	
R^2	0.074		0.079		0.055		0.021		0.0447	
RESET p-value*	0.545		0.621		0.396		0.126		0.5361	

Seshh: household socio-economic status; **age**: age; **employd**: employment status; **FCEvUs**: ever use of a female condom; **MCEvrUse**: male condom ever use; **PaidMCS**: whether they had ever paid for male condoms; **InitiateMC**: if they had initiated condom use themselves the last time they used a condom; **Cohab**: if they are living with a sexual partner.

[3] Variable names at end of table

Tobit	Diaphragm		Microbicide		Female condom		Single use		Reusable	
	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>t		P>|t|
seshh	9.984	***<0.01***	5.535	***<0.01***	2.366	***0.03***	1.308	***0.01***	7.247	***<0.01***
age	-0.745	***0.02***	-0.613	***<0.01***	-0.490	***<0.01***	-0.233	***<0.01***	-0.828	***<0.01***
employd	9.722	***0.04***	8.721	***<0.01***	5.169	***0.02***	0.721	0.48	3.316	0.24
FCEvUs	-15.719	0.20	-6.728	0.38	-1.596	0.78	1.316	0.61	-2.402	0.75
MCEvrUse	-5.123	0.33	5.775	***0.06***	1.178	0.65	-1.287	0.27	-2.719	0.40
PaidMCS	5.691	0.46	-2.183	0.60	-5.131	0.17	0.816	0.61	-0.165	0.97
IntiatMCS	4.193	0.40	4.832	***0.09***	0.244	0.92	2.129	***0.06***	6.478	***0.04***
Cohab	6.485	0.14	4.298	***0.09***	-1.477	0.49	1.089	0.27	-2.157	0.43
RiskNo	11.233	***0.02***	4.833	***0.07***	1.783	0.42	-0.399	0.70	1.996	0.48
_cons	47.395	***<0.01***	21.074	***<0.01***	20.656	***<0.01***	6.698	***<0.01***	47.289	***<0.01***
sigma**	48.3389		30.3494		21.16643		12.61		36.99	
n=	606		745		514		1012		1012	
pseudo-R^2	0.008		0.011		0.007		0.0043		0.0091	

Tobit logs	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t
seshh	0.176	***<0.01***	0.222	***<0.01***	0.188	***<0.01***	0.164	***<0.01***	0.294	***<0.01***
age	-0.016	***0.03***	-0.017	***0.01***	-0.010	0.17	- 0.022	***<0.01***	- 0.016	***0.02***
employd	0.141	0.18	0.221	***0.02***	0.188	***0.08***	0.266	***0.02***	0.072	0.49
FCEvUs	-0.344	0.23	0.119	0.68	0.029	0.91	- 0.218	0.40	0.181	0.52
MCEvrUse	-0.133	0.27	0.214	***0.06***	0.034	0.79	- 0.039	0.76	- 0.112	0.36
PaidMCS	0.347	***0.05***	-0.174	0.25	-0.322	***0.07***	- 0.081	0.62	0.068	0.66
IntiatMCS	0.041	0.72	0.051	0.63	0.012	0.92	0.047	0.69	0.140	0.21
Cohab	0.169	***0.10***	0.160	***0.10***	-0.015	0.88	0.174	***0.10***	- 0.054	0.60
RiskNo	0.129	0.22	0.174	***0.08***	0.286	***0.01***	0.242	***0.03***	0.214	***0.04***
_cons	3.535	***<0.01***	2.654	***<0.01***	2.281	***<0.01***	2.120	***<0.01***	3.287	***<0.01***
/sigma	1.05		1.04		0.93		0.96		1.07	
n=	533		604		395		508		744	
pseudo-R^2	0.020		0.028		0.025		0.031		0.034	

Tobit on Log(WTP+1)	Diaphragm		Microbicide		Female condom		Single use		Reusable	
	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t
seshh	0.308	***<0.01***	0.315	***<0.01***	0.192	***0.01***	0.165	***0.03***	0.275	***<0.01***
age	-0.032	***<0.01***	-0.024	***0.01***	-0.039	***<0.01***	-0.027	***0.01***	-0.033	***<0.01***
employd	0.154	0.28	0.290	***0.03***	0.245	0.11	0.071	0.66	0.160	0.29
FCEvUs	-0.490	0.20	-0.098	0.80	0.115	0.76	0.471	0.26	-0.296	0.47
MCEvrUse	-0.172	0.30	0.235	0.12	0.114	0.52	-0.147	0.43	-0.008	0.97
PaidMCS	0.357	0.14	-0.178	0.39	-0.309	0.22	0.127	0.62	0.042	0.86
IntiatMCS	0.093	0.55	0.128	0.38	-0.018	0.91	0.338	***0.06***	0.226	0.18
Cohab	0.107	0.44	0.053	0.68	-0.024	0.87	0.079	0.61	-0.199	0.17
RiskNo	0.308	***0.03***	0.148	0.27	-0.007	0.96	-0.111	0.50	-0.084	0.58
_cons	3.680	***<0.01***	2.397	***<0.01***	2.688	***<0.01***	1.126	***<0.01***	3.317	***<0.01***
/sigma	1.52		1.54		1.47		2.05		2.04	
n=	606		745		514		1012		1012	
pseudo-R^2	0.021		0.021		0.016		0.006		0.011	

Tobit with opt-out as WTP=0	Diaphragm		Microbicide		Female condom		Single use		Reusable	
	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|
seshh	4.979	***0.03***	4.089	***<0.01***	1.104	0.29	1.045	***0.01***	5.911	***<0.01***
age	-0.537	***0.10***	-0.766	***<0.01***	-0.160	0.28	-0.180	***<0.01***	-0.652	***<0.01***
employd	8.589	***0.08***	9.525	***<0.01***	3.448	0.12	0.620	0.45	2.691	0.24
FCEvUs	-13.075	0.33	-10.573	0.15	0.020	1.00	1.410	0.51	-2.135	0.73
MCEvrUse	2.692	0.63	3.782	0.22	8.659	***<0.01***	-0.951	0.31	-1.925	0.46
PaidMCS	-5.161	0.51	-0.991	0.82	-6.165	***0.09***	0.590	0.65	0.203	0.96
IntiatMCS	3.277	0.54	4.796	***0.10***	-2.167	0.37	1.723	***0.06***	4.983	***0.05***
Cohab	4.210	0.38	3.552	0.17	0.325	0.88	0.782	0.33	-2.119	0.34
RiskNo	7.321	0.14	2.451	0.36	1.852	0.41	-0.282	0.73	1.331	0.56
_cons	4.902	0.66	16.370	***0.01***	-11.216	***0.03***	5.645	***<0.01***	41.114	***<0.01***
sigma**	61.49		34.26		26.10		10.3098		30.5775	
n=	1012		1012		1012		1012		1012	
pseudo-R^2	0.002		0.008		0.005		0.005		0.008	

Interval regression	When0=[0,0] Diaphragm Coef.	P>|z|	Microbicide Coef.	P>|z|	Female condom Coef.	P>|z|	Single use Coef.	P>|z|	Reusable Coef.	P>|z|
seshh	7.374	***<0.01***	3.542	***<0.01***	1.744	***<0.01***	0.730	***<0.01***	5.369	***<0.01***
age	-0.593	***0.01***	-0.284	***<0.01***	-0.235	***<0.01***	-0.122	***<0.01***	-0.541	***<0.01***
employd	7.327	***0.04***	3.328	***0.02***	2.836	***0.02***	0.591	0.21	2.081	0.30
FCEvUs	-10.655	0.17	-0.406	0.91	0.001	1.00	0.294	0.79	0.058	0.99
MCEvrUse	-1.831	0.63	2.898	***0.07***	-0.019	0.99	-0.590	0.27	-2.100	0.32
PaidMCS	7.789	0.21	-1.798	0.47	-3.629	***0.05***	0.215	0.79	0.458	0.89
IntiatMCS	1.506	0.69	2.013	0.23	0.373	0.77	0.953	***0.07***	4.313	***0.05***
Cohab	5.280	***0.09***	1.700	0.23	-0.587	0.60	0.622	0.18	-1.826	0.33
RiskNo	4.198	0.20	1.260	0.38	0.830	0.48	0.187	0.70	2.202	0.28
_cons	50.461	***<0.01***	20.976	***<0.01***	17.629	***<0.01***	10.225	***<0.01***	53.933	***<0.01***
sigma**	34.6		16.4		11		6.3		25.5	
n=	606		745		514		1012		1012	
pseudo-R^{2***}	0.066		0.071		0.042		0.011		0.029	

Interval regression	When 0=[.,0] Diaphragm Coef.	P>|z|	Microbicide Coef.	P>|z|	Female Condom Coef.	P>|z|
seshh	8.760	***<0.01***	4.386	***<0.01***	2.108	***<0.01***
age	-0.747	***<0.01***	-0.349	***<0.01***	-0.350	***<0.01***
employd	7.906	***0.05***	4.127	***0.01***	3.481	***0.03***
FCEvUs	-12.668	0:18	-1.271	0.63	0.293	0.93
MCEvrUse	-2.209	0.61	3.547	***0.03***	0.501	0.77
PaidMCS	8.228	0.23	-2.253	0.63	-4.304	***0.07***
IntiatMCS	1.937	0.65	2.466	0.22	0.353	0.83
RiskNo	5.529	0.14	1.390	***0.10***	0.333	0.83
_cons	52.444	***<0.01***	20.123	***<0.01***	18.977	***<0.01***
sigma**	39.1		20.0		14.2	
n=	606		745		514	
pseudo-R^{2***}	0.059		0.067		0.032	

* RESET p-value tests the Ho: that there are no omitted variables. This test is not available in Stata for TOBIT and interval regression models

** sigma represents the standard error of estimate

*** pseudo R^2 is calculated as average of the correlations between the predicted values and the upper and lower limits of the intervals [471].

seshh: household socio-economic status; **age**: age; **EducYrs** level of education; **employd**: employment status; **FCEvUs**: ever use of a female condom; **MCEvrUse**: male condom ever use; **PaidMCS**: whether they had ever paid for male condoms; **InitiateMC**: if they had initiated condom use themselves the last time they used a condom; **Cohab**: if they are living with a sexual partner.

Excluding Outliers ($WTP_{diaphragm}$<R201 (n=3); $WTP_{microbicide}$<R101(n=7); $WTP_{female\ condom}$<R91(n=5))

OLS	Diaphragm Coef.	P>t	Microbicide Coef.	P>t	Female condom Coef.	P>t
seshh	7.372	***<0.01***	3.763	***<0.01***	1.631	***<0.01***
age	-0.566	***0.01***	-0.294	***0.01***	-0.222	***0.01***
employd	5.032	0.19	3.143	***0.07***	3.365	***0.02***
FCEvUs	-11.832	***0.09***	-1.812	0.57	-0.292	0.90
MCEvrUse	-1.672	0.68	2.393	0.16	-0.639	0.61
PaidMCS	7.603	0.25	-0.068	0.98	-4.719	***0.01***
IntiatMCS	1.256	0.74	2.332	0.23	1.558	0.25
Cohab	6.166	***0.07***	1.212	0.44	-0.930	0.44
RiskNo	4.912	0.20	-0.437	0.77	-0.011	0.99
_cons	45.516	***<0.01***	20.767	***<0.01***	16.008	***<0.01***
n=	603		737		509	
r^2	0.0649		0.0726		0.0508	
RESET p-value*	0.2968		0.4362		0.0444	

Tobit	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|
seshh	8.698	***<0.01***	4.637	***<0.01***	1.968	***0.01***
age	-0.721	***0.01***	-0.356	***0.01***	-0.341	***<0.01***
employd	5.375	0.17	3.858	***0.04***	3.963	***0.01***
FCEvUs	-13.877	0.18	-2.746	0.61	0.130	0.97
MCEvrUse	-2.066	0.64	2.933	0.18	-0.172	0.92
PaidMCS	8.116	0.21	-0.468	0.88	-5.378	***0.04***
IntiatMCS	1.709	0.69	2.758	0.19	1.604	0.33
Cohab	6.455	***0.08***	1.029	0.58	-0.837	0.57
RiskNo	6.275	0.11	-0.489	0.80	-0.698	0.65
_cons	46.934	***<0.01***	19.447	***<0.01***	17.156	***<0.01***
sigma	40.74		21.83		14.57	
n=	603		737		509	
pseudo-r^2	0.0078		0.0101		0.0082	

Interval regression	Coef.	P>|t|	Coef.	P>|z|	Coef.	P>|z|
seshh	7.125	***<0.01***	3.450	***<0.01***	1.626	***<0.01***
age	-0.592	***0.01***	-0.241	***0.01***	-0.222	***<0.01***
employd	6.422	***0.07***	2.537	***0.08***	2.494	***0.04***
FCEvUs	-10.345	0.18	0.311	0.93	0.502	0.83
MCEvrUse	-1.179	0.75	2.223	0.15	-0.214	0.86
PaidMCS	8.321	0.18	-1.558	0.52	-3.942	***0.02***
IntiatMCS	1.044	0.78	1.894	0.25	0.602	0.61
Cohab	5.240	***0.10***	0.983	0.47	-0.473	0.66
RiskNo	3.377	0.30	0.128	0.93	0.239	0.82
_cons	50.205	***<0.01***	20.568	***<0.01***	17.159	***<0.01***
sigma	34.20		16.01		10.68	
n=	603		737		509	
pseudo R^2***	0.06771		0.06878		0.04179	

seshh: household socio-economic status; **age**: age; **EducYrs** level of education; **employd**: employment status; **FCEvUs**: ever use of a female condom; **MCEvrUse**: male condom ever use; **PaidMCS**: whether they had ever paid for male condoms; **InitiateMC**: if they had initiated condom use themselves the last time they used a condom; **Cohab**: if they are living with a sexual partner.

Appendix 11. Exploration of key socio-demographic characteristics

Table A11-1Descriptive statistics

		All	
	Variable coding	Count	%
All		1,017	100%
Condom used at last sex act (MCLastS)	No (-1)	699	69%
	Yes (1)	318	31%
Cohabiting with sexual partner (Cohab)	No (-1)	456	45%
	Yes (1)	560	55%
Current contraceptive use (contr)	No (-1)	764	75%
	Yes (1)	253	25%
Ever experienced difficulties getting partner to use condoms (DiffMC)	No (-1)	630	62%
	Yes (1)	382	38%
Employed (emplyd)	No (-1)	660	65%
	Yes (1)	357	35%
Self-perceived risk of HIV (RiskH)	High (3)	223	23%
(RiskM)	Medium (2)	260	27%
(RiskL)	Low (1)	234	24%
(RiskNo)	None (0)	261	27%
Educational attainment	Incomplete secondary	457	45%
	Complete secondary	276	27%
	Other (<10% each)	283	28%
Educational attainment* (educyrs)	Mean in years	10.04	
Age (age)	Mean in years	31.53	

*This is an approximate number of years of school derived from the average number of years from the schooling categories.

	Correlations													
	Cohab	DiffMC	MCLastS	Em-ployd	Risk-No	Risk-low	Risk-Med	Risk-High	hhSES	Educ-Yrs	age	DG	MD	FEMC
Cohab (Are you currently living with a sexual partner?)	1.00													
DiffMC (Ever difficulties get partners to use condom)	-0.05	1.00												
MCLastS (The last time you had sex, was a condom used?)	***-0.34***	**-0.18**	1.00											
employed	0.04	-0.08	-0.04	1.00										
RiskNo	-0.03	**-0.12**	0.07	-0.01	1.00									
Risklow	0.04	-0.03	0.05	0.03	***-0.32***	1.00								
RiskMed	-0.05	0.02	0.02	0.02	***-0.34***	***-0.32***	1.00							
RiskHigh	0.02	**0.15**	**-0.12**	-0.06	***-0.31***	**-0.29**	***-0.31***	1.00						
Household SES (hhSES)	-0.02	**-0.10**	**0.09**	**0.27**	-0.00	**0.13**	0.06	**-0.16**	1.00					
EducYrs	**-0.15**	**-0.08**	**0.13**	**0.25**	-0.02	**0.10**	0.03	-0.08	**0.48**	1.00				
age	***0.38***	-0.01	**-0.25**	**0.29**	0.00	0.02	-0.04	-0.00	0.07	**-0.16**	1.00			
Diaphragm preferred(DG)	0.05	0.05	-0.06	0.00	-0.04	-0.03	0.01	0.08	-0.04	-0.05	0.06	1.00		
Microbicide preferred (MD)	0.01	-0.02	**-0.11**	-0.04	0.03	-0.05	0.02	-0.02	-0.03	-0.01	-0.06	***-0.60***	1.00	
Female condom preferred (FEMC)	0.02	0.03	-0.02	0.02	0.01	0.02	-0.01	-0.03	-0.01	-0.03	**0.10**	**-0.25**	***-0.38***	1.00

Bold indicates correlation is significant at the 0.01 level (2-tailed). Italic indicates correlations above ± 0.3.

Table A shows the correlations between the socio-demographic characteristics that were included in the different models. In this table categorical variables are entered as traditional dummy variables rather than effects coded variables. The highest correlation is between preferred products (a negative correlation between preferences for microbicides and the diaphragm or -.6); this is not surprising as they are mutually exclusive. The next highest correlation is .48 between household socio-economic status and years of education. This is to be expected. Age and cohabiting would also be expected to be correlated, and has a correlation coefficient of 0.38. Self perceived risk of HIV displays and interesting pattern with 'having experience difficulties using a condom' and 'used a condom last sex act'. The correlation with 'difficulties in condom use' moves from significantly negative for women who perceive themselves at no risk of HIV to significantly positive for women who perceive themselves at high risk. The opposite pattern is observed for the 'condom use in last sex act' variable. This is interesting as it shows the expected direction of relationships. Moreover, it sheds a light on the possible direction of causality in the condom use - HIV risk relationship. It appears that one's risk perception is related to their use of protection; whereas one might also argue that condom use could be related to the perception of risk at the last sex act, i.e. did not use because the sex act was not perceived risky versus considers oneself at high risk because did not use condom. However, these correlations are small in magnitude.

Appendix 12. Estimation of preferences for product attributes: Random Parameters Logit with correlations results and discussion.

Table A12-1 Random Parameters Logit with correlations, 25 Runs

	Coefficient	p-value
Random parameters in utility functions		
BDG2	0.56	<0.01
BMD2	1.22	<0.01
BSECR	0.18	0.111
BPRG	6.19	<0.01
BHIV	12.28	<0.01
BLNPRC	-0.45	<0.01
C	9.88	<0.01
Nonrandom parameters in utility functions		
BDG*MClastS	0.51	<0.01
BMD*MClastS	0.16	0.186
BSECR*DiffMC	0.32	<0.01
BPRG*cohab	-0.35	0.206
BHIVRISK	1.83	<0.01
HIV*cohab	-0.27	0.512
BLPRC*EMP	0.14	<0.01
C*MClastS	4.16	<0.01
C*DiffMC	-1.46	<0.01
C*cohab	-0.28	0.448
Diagonal values in Cholesky matrix, L.		
UsBDG2	1.34	<0.01
UsBMD2	0.49	0.281
UsBSECR	0.91	0.028
NsBPRG	0.23	0.719
NsBHIV	9.92	<0.01
NsBLNPRC	0.24	0.102
NsC	1.97	<0.01
Below diagonal values in L matrix. V = L*Lt		
BMD2:BDG	3.70	<0.01
BSEC:BDG	0.74	0.04
BSEC:BMD	3.22	<0.01
BPRG:BDG	-0.74	0.52
BPRG:BMD	-1.16	0.39
BPRG:BSE	-10.18	<0.01
BHIV:BDG	-11.28	<0.01
BHIV:BMD	-2.89	0.08
BHIV:BSE	-7.09	<0.01
BHIV:BPR	-7.61	<0.01

BLNP:BDG	0.50	0.02
BLNP:BMD	-0.57	0.02
BLNP:BSE	-0.25	0.27
BLNP:BPR	-0.12	0.37
BLNP:BHI	-0.56	<0.01
C:BDG	5.04	<0.01
C:BMD	-8.94	<0.01
C:BSE	-13.37	<0.01
C:BPR	1.34	0.10
C:BHI	5.54	<0.01
C:BLN	2.06	<0.01
n=	6,102	
LLR	-5,387.17	

The critical thing that can be learned from the RPL model is in the covariance matrix. Large covariances suggest that individuals with large preferences for on attribute have a large preference for the other. This is the case most notably for HIV and the diaphragm, with a strong correlation of preferences between high valuation of HIV prevention effectiveness and low values for the diaphragm. Using the covariance matrix, packages of attributes could be identified. Though interesting in the physical attributes, it is of greater interest in the distribution scenarios, where it could guide the composition of how to distribute the different products within certain outlets. It is unlikely that we can mix and match the product attributes, so it is not really worth the exploration at the current time. The other interesting thing to point out from the RPL with correlations output is the standard deviations of the random parameter. All of the product attributes were defined as random parameters, which is subsequently tested. We see each product attribute has significant level of heterogeneity around the mean. This suggests much variation in preferences between women. This is still the case despite trying to capture variations in preferences by including a number of SDCs.

Appendix 13 Estimation of preferences for distribution strategies

Appendix 13.1 Estimation of preferences for distribution strategies

Before considering the model results, the best model to use needs to be identified. The right half of Table A13.1 shows the results of the different RPL runs. For the RPL model, it is not as easy to retrieve the omitted categories by rerunning the model with different omitted attribute levels. In doing this all the coefficients change. This is due to the estimation method which uses matrix multiplication. Even changing the ordering of the variables in the procedure will affect the exact coefficients. Therefore 2 runs of each RPL model are presented to show estimates for all attribute levels.

Parameter values represent relative utilities, standardised around 0. The standard deviations show if there is significant heterogeneity of preferences that is not captured by the included interaction terms. The test for IIA here is done by examining the standard deviations of the parameters. RPL relaxes IIA and allows for preference heterogeneity. That means that it allows for not all people having the same preferences and tests whether there is a distribution around the estimated relative utility.

In the first set of runs (RPL1) there are potentially 7 random parameters: Collection from a box, a private room, or a shelf; advertising for pregnancy prevention, HIV, pleasure and women's empowerment. However, only the private room is significant in both runs. These distributions are not particularly stable. It is common practice to develop the model by removing variables with insignificant distributions from the parameters specified as random. When this is done repeatedly, the only variable that continues to have a significant distribution is collection from a private room (RPL2). For this reason we have chosen not to reject the IIA assumption and will continue from here onwards interpreting parameter estimates from the MNL model.

Table A13-1 Estimation of distribution strategy preferences- testing for unobserved heterogeneity using the MNL and RPL models

	MNL		RPL (runs excluding different attribute levels)							
			RPL1a (25its)		RPL1b (50 its)		RPL2 iteratively identifying robustly random parameters			
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Source										
Clinic	0.29	<0.01	0.61	<0.01			0.407	<0.01		
Supermarket	-0.20	<0.01			-0.45	0.02			-0.257	<0.01
Pharmacy	0.33	<0.01	0.52	<0.01	0.60	<0.01	0.429	<0.01	0.382	<0.01
Spaza (corner store)	-0.43	<0.01	-0.70	<0.01	-0.79	<0.01	-0.527	<0.01	-0.500	<0.01
Collection method										
Box or dispensing machine	0.04	0.38	0.05	0.62			-0.012	0.85		
A shelf	0.02	0.65			0.07	0.57			0.028	0.64
A person behind a counter	-0.18	<0.01	-0.35	<0.01	-0.35	0.01	-0.188	<0.01	-0.196	<0.01
In a private room	0.11	0.01	0.25	0.03	0.28	0.04	0.168	0.03	0.160	0.01
Advertising message										
HIV prevention	0.10	0.02	0.15	0.07	0.22	0.09	0.141	0.03	0.122	0.02
Women's empowerment	0.13	<0.01			0.29	0.04			0.162	<0.01
Enhanced pleasure	-0.30	<0.01	-0.67	<0.01	-0.65	0.02	-0.416	<0.01	-0.338	<0.01
Pregnancy prevention	0.06	0.15	0.21	0.10			0.089	0.15		
Price	-0.04	<0.01	-0.07	<0.01	-0.07	<0.01	-0.047	<0.01	-0.040	<0.01
Parameter distributions										
Us_Clinic			0.29	0.77						
Us_Supermarket					0.95	0.41				
Us_Pharmacy			0.46	0.57	0.30	0.82				
Us_Spaza			0.87	0.26	0.42	0.65				
Us_Box			2.44	0.01						
Us_Shelf					2.38	0.08				
Us_Counter			0.02	0.99	0.20	0.83				
Us_Private room			2.50	0.02	2.30	0.07	2.735	<0.01	1.340	<0.01
Us_Ad HIV			1.85	0.01	0.16	0.89				
Us_Ad women's empowerment					1.94	0.04				
Us_Ad pleasure			1.86	<0.01	1.27	0.25				
Us_Ad pregnancy			1.11	0.04						
Ts_Price			0.10	0.20	0.18	0.19				
llr	-1951.17		-1937.02		-1945.85		-1946.430		-1949.428	

Table A13-2 Price: random distribution functional form in RPL

	Normal		Triangular		Lognormal	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
BCLIN	0.614	<0.01	0.613	<0.01	1.328	<0.01
BPHARM	0.52	<0.01	0.521	<0.01	0.817	<0.01
BSPAZ	-0.702	<0.01	-0.701	<0.01	-1.062	<0.01
BBOX	0.049	0.605	0.048	0.616	-0.031	0.816
BCNTR	-0.352	<0.01	-0.351	<0.01	-0.435	<0.01
BPVTRM	0.245	0.027	0.246	0.029	0.225	0.178
BADPREG	0.148	0.103	0.148	0.103	0.246	0.099
BADHIV	0.206	0.068	0.208	0.074	0.399	0.021
BADPLS	-0.667	<0.01	-0.668	<0.01	-1.081	<0.01
BPRICE	-0.07	<0.01	-0.07	<0.01	-35.19	1
UsBCLIN	0.291	0.767	0.288	0.767	6.32	<0.01
UsBPHARM	0.431	0.593	0.456	0.567	2.182	0.083
UsBSPAZ	0.891	0.244	0.867	0.261	0.259	0.775
UsBBOX	2.449	0.011	2.439	0.012	0.102	0.905
UsBCNTR	0.09	0.95	0.016	0.992	0.397	0.59
UsBPVTRM	2.456	0.017	2.497	0.018	4.397	<0.01
UsBADPRE	1.109	0.043	1.115	0.043	1.822	0.016
UsBADHIV	1.848	0.01	1.851	0.013	1.702	0.025
UsBADPLS	1.863	<0.01	1.859	<0.01	4.204	<0.01
NsBPRICE	0.04	0.18	0.098	0.199	1.53	1
	WTP values					
BCLIN	-8.8		-8.79		-0.04	
BPHARM	-7.46		-7.48		-0.02	
BSPAZ	10.06		10.06		0.03	
BBOX	-0.71		-0.69		0	
BCNTR	5.05		5.03		0.01	
BPVTRM	-3.52		-3.52		-0.01	
BADPREG	-2.12		-2.12		-0.01	
BADHIV	-2.96		-2.99		-0.01	
BADPLS	9.56		9.58		0.03	
BPRICE						

Appendix 13.2 Estimation of: "Do women's preferences for distribution strategies differ by product?" including the female condom.

In Table A13-3, the hypothesis is tested: Do women's preferences for distribution strategies differ by product? The estimation allows for variation by male condom (omitted category), female condom (FC), microbicide (MCD) and diaphragm (DGM). The specification where all products are included appears not to work well, because some of the main effects loose significance (private room (BPVTRM) and advertising for HIV (BADHIV)). Only diaphragm seems to have different preferences in the MNL model and then only for a few distribution strategy attributes characteristics: collection from the box (BBOX), advertising messages for HIV (ADHIV) and pregnancy (ADPREG) and price (BPRICE). The MNL model also shows the preferences for advertising for pregnancy prevention is higher for microbicides. The RPL model does show heterogeneity around the advertising messages (HIV (ADHIV), pregnancy (ADPREG), pleasure (ADPLS)), consistent with a priori expectations around using advertising to target specific population groups.

Table A13-3 distribution preferences by product

	2 MNL interactions for products				2b RPL for all products			
	Coeff.	P-value		WTP	Coeff.	P-value		WTP
BCLIN	0.26	0.04	**	9.60	1.06	0.05	**	14.16
BPHARM	0.46	0.00	***	16.85	0.86	0.02	**	11.51
BSPAZ	-0.50	0.00	***	-18.55	-1.17	0.01	**	-15.52
BBOX	0.16	0.13		6.04	0.47	0.20		6.23
BCNTR	-0.21	0.05	*	-7.89	-0.59	0.10	*	-7.85
BPVTRM	0.12	0.30		4.27	0.19	0.54		2.52
BADHIV	-0.01	0.95		-0.25	-0.08	0.79		-1.08
ADPREG	0.18	0.11		6.60	0.48	0.15		6.38
ADPLS	-0.32	0.01	***	-11.62	-0.74	0.05	*	-9.91
BPRICE	-0.03	0.00	***		-0.08	0.04	**	
BCLI_DGM	-0.08	0.43			-0.05	0.83		
BCLI_MCD	-0.09	0.29			-0.11	0.64		
BCLIN_FC	0.01	0.93			0.30	0.35		
BPHR_DGM	0.12	0.17			0.28	0.23		
BPHR_MCD	0.10	0.22			0.26	0.24		
BPHR_FC	0.08	0.45			0.12	0.63		
BSPZ_DGM	-0.07	0.42			-0.21	0.30		
BSPZ_MCD	-0.06	0.44			-0.18	0.36		
BSPZ_FC	-0.06	0.55			-0.20	0.40		
BBOX_DGM	0.14	0.10	*		0.48	0.14		
BBOXCD	0.03	0.66			0.17	0.47		
BBOX_FC	0.09	0.33			0.30	0.30		
BCNTR_DGM	-0.10	0.21			-0.30	0.22		
BCNTR_MCD	0.06	0.46			0.09	0.62		
BCNR_FC	0.01	0.92			0.00	1.00		
BPVRM_DGM	0.01	0.93			-0.07	0.78		
BPVR_MCD	-0.05	0.52			-0.19	0.42		
BPVRM_FC	0.01	0.95			-0.10	0.71		

BAHIV_DGM	-0.18	0.03	**	-0.47	0.09	*
BAHIV_MCD	-0.11	0.15		-0.32	0.19	
BAHIV_FC	-0.03	0.79		-0.09	0.74	
BAPRG_DGM	0.17	0.04	**	0.36	0.16	
BAPRG_MCD	0.13	0.09	*	0.28	0.22	
BAPRG	0.05	0.63		0.19	0.48	
BPLS_DGM	-0.09	0.32		-0.17	0.47	
BPLS_MCD	-0.04	0.60		-0.03	0.89	
BAPLS_FC	0.03	0.74		0.23	0.44	
BPRC_DGM	0.01	0.08	*	0.02	0.15	
BPRC_MCD	0.01	0.13		0.02	0.22	
BPRC_FC	0.01	0.54		0.00	0.82	
UsBCLIN				2.02	0.12	
UsBPHARM				0.81	0.36	
UsBSPAZ				1.35	0.27	
UsBBOX				2.95	0.03	**
UsBCNTR				0.80	0.45	
UsBPVTRM				3.57	0.06	*
UsADPREG				1.31	0.09	*
UsBADHIV				2.97	0.04	**
UsADPLS				2.68	0.03	**
TsBPRICE				0.12	0.28	